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SOME new phases of the threatened Grand Trunk-New Haven warfare in New England have developed. Many months have passed since the Grand Trunk got its charter from the Rhode Island legislature for the extension of the system from Palmer, Mass., to Providence, R. I. A preliminary survey was made, followed by a new survey of the Palmer-Providence route, but thus far, apparently, not a spadeful of earth has been turned or other positive steps taken by the Grand Trunk. But on the other side there have been notes of warning. The New Haven is to ask authority of the Vermont legislature for power to build certain paralleling lines which will free its controlled Boston & Maine from all dependence on the Grand Trunk's connecting links. The Boston & Maine has a business of some millions of dollars with the Grand Trunk system, and reported threats of diverting it, largely to the rival Canadian Pacific, have undoubtedly a firmer basis than rumor. This is on the New England side of the border. On the Canadian side the subject is still intermixed with politics; the government is harassed at one extremity of its domain by the western farmers assailing the high tariff, and at the other by the maritime provinces opposing, as detrimental to their seaports, railway extension into New England. The New Haven railway authorities assert that it will cost the Grand Trunk $10,000,000 to get to Providence with even minor terminal facilities. The Grand Trunk people say they can get there for half that amount, and they have succeeded in winning a case before the Massachusetts Railway Commission, from whom the New Haven sought permission to build a line obstructive, if not fatal, to the Grand Trunk project. Two outcomes now seem of about equal probability: One is the pushing through, sooner or later, Canadian party politics allowing it, of the Grand Trunk enterprise, during a period of acute and indefinite war of two big railways. The other is that, after a spell of threats, there will be a treaty based on concessions by which the Grand Trunk surrenders the Providence invasion for new traffic privileges in New England, very likely reaching to New York. Incidentally, that old thorn in the New Haven side, the holding of the Central Vermont by the Grand Trunk, may be withdrawn.

WE published last week a statistical exhibit, prepared under the direction of the Interstate Commerce Commission, showing in full the commission's own estimate of the earnings and expenses of the New York Central & Hudson River during the past 10 years; and we published abstracts from similar statements for other roads. While differences of opinion in accounting theory are as sure to be found, as are creeds in religion, it appears that the method pursued by the Interstate Commerce Commission is, on the whole, fair. From the statements that have so far been completed, it seems to us that the contention of the roads in the rate cases is strikingly borne out by these figures compiled by the judges in the case. There have been two criticisms of the method used in preparing the figures—one well founded and the other not. The method of showing accumulated surplus has been criticised because accumulated surplus is not in the form of cash, but may be invested in road and equipment, or in other property. This is a fact; but, nevertheless, under the laws of the United States, and under the rulings of the Interstate Commerce Commission, this surplus *is* available for *distribution.* If it is invested in the property, it may be distributed in the form of stock dividends. There have been any number of instances where roads have capitalized their accumulated surplus, or have paid large extra dividends out of this surplus. It would seem, therefore, that in showing accumulated surplus as a profit and loss surplus available for distribution, the commission was well within sound accounting practice. In the New York Central figures, as in case of the other roads, the Interstate Commerce Commission showed "operating income from railway operation: per cent. on cost of road and equipment" for the 10 years, arriving at this figure by taking the ratio of operating income to cost of road and equipment, as shown on the company's balance sheet. Cost of road and equipment, of course, means road and equipment owned and does not include road and equipment leased. The New York Central & Hudson River owns only a little over 800 miles of road, while it operates over 3,500 miles. Operating income, therefore, is profit from the operation of 3,500 miles of road; and it has been pointed out that it is not fair to give a ratio of this profit applied to cost of road and equipment of but 800 miles. This ratio, which in the case of the New York Central was something over 9 per cent., is obviously misleading; but from the returns made by the roads it would probably be quite im-

possible to get at the actual cost of road and equipment of the 2,700 miles of line operated but not owned. What would appear a fair way to do would be to subtract net rentals from operating income and then to get the ratio of this net operating income to cost of road and equipment owned. If this is done in the case of the New York Central, it appears that the road earned 5.1 per cent., and not 9 per cent. on its cost of road and equipment. Even this figure is misleading, however, if it is not fully borne in mind that the earnings from the 800 miles of line would not be 5 per cent. on its cost, or anything like it, if the company did not operate the other 2,700 miles. This fact becomes all the more noticeable if the difference between the 5 per cent., as shown by our method of compilation, and that of the Interstate Commerce Commission, showing 9 per cent., is analyzed. It appears that the New York Central pays in rentals for the operation of 2,700 miles of line something like $10,000,000. If the rentals, therefore, are all the returns that the owners of the 2,700 miles of line get on their property, this property obviously must have cost very much less than the New York Central's 800 miles, or else they are getting an entirely inadequate return on their investment. As a matter of fact, this discrepancy is probably caused by the manner in which returns are made.

SOME months ago, when the first census returns for the American cities came in, we had occasion to refer to the marked urban drift of population, and its relation to railway business. The publication of the census returns for the whole country by states now makes it possible to study the subject in a broader way. It is axiomatic that increased population spells increased travel and increased product, though they may be in diverse ratios; in one region, like the far West, they may mean railway extension; in another region, like the older Eastern states, they may mean increased business of old roads without much extension of lines, though with a good many costly improvements. The new census shows us three regions of great increment of population. There is an eastern factory group of states with much concentration in cities, thus supplying both travel and high-class freight products; a second group of high increment composed largely of the old slave states of the South—but with Oklahoma and two or three new states added—cotton growers mainly, but with stalwart factory centres growing fast, and, as a whole, a sure region of considerable new railway enterprise; a third group, in the central West, lowest in growth of population, where new railway business must depend chiefly on the product of manufacturing cities; and, finally, that vast region, with its extremely high population increment, made up of the far West, including the Pacific slope and a few states eastward, where the railway is now having, and will have for some years to come, a large field for expansion. Its most interesting fact is the growth in the double tier of states next to or near the Canadian border and west of Minnesota:

	Pop. 1910.	Pop. 1900.	P. C. increase.
Idaho	325,594	161,772	101.3
Montana	376,053	243,329	54.5
Oregon	672,765	413,536	62.7
North Dakota	577,056	319,146	80.8
South Dakota	583,888	401,570	45.4
Wyoming	154,145	92,531	57.0
Washington	1,141,990	513,103	120.4
Total	3,831,491	2,144,987	79.7

To the above, perhaps California, with its present population of 2,357,449, an increase of 60.1 per cent., may be added. On that northwest tier of states, growing rapidly, most of them states comparatively new, with great rival railway forces on both sides of the border and after crossing it, we are certain during the next census decade to see much railway history made. Such properties as the St. Paul, the Hill lines, the Canadian Pacific and the Grand Trunk Pacific, the latter yet to come, lie in a region where we are likely to see, not railway problems only, but others that are political and international.

INTERSTATE COMMERCE APPOINTMENTS.

PRESIDENT TAFT has made up the Commerce Court (as announced in our news column) by putting at the head of it Chairman Knapp, of the Interstate Commerce Commission and by appointing for the other four places federal judges, or men who have had experience as judges. Mr. Knapp is the only one of the five who has had extensive experience in transportation matters. This course of the President was almost compulsory, as he could not appoint two judges of the new court from the same judicial circuit, since after serving their terms the members become circuit court judges. Under that limitation he could hardly be expected to find many railway experts. The vacancy on the Interstate Commerce Commission, and one other vacancy there, are filled by the appointment of two men well known to railway officers. The new chairman of the commission will be selected by the members themselves. It is understood that Messrs. Prouty and Lane were offered places on the Commerce Court (Mr. Prouty for the five year term) and that they declined; and the declinations, it is said, were due largely or wholly to the importunities of shippers who insisted that these two remain on the commission to take part in deciding the important cases now pending there.

If Mr. Knapp had been given this promotion any time prior to November 22 the news of it would have been received with approval by all who have closely followed the work of the Interstate Commerce Commission. It happened, however, that the annual dinner of the Railway Business Association was held in New York on the date mentioned, that Mr. Knapp made a speech there; that in that speech he outlined the policy that he thought ought to be followed in the regulation of railways; and that the shippers and their lawyers who are engaged in trying to prevent advances in freight rates did not agree with what he said. As they did not agree with it, of course they said that Mr. Knapp was pro-railway, and, therefore, there has been some criticism of his promotion.

We are not surprised that Mr. Knapp has been criticised. For many years the Interstate Commerce Commission and its individual members have been seeking to secure extension of their jurisdiction over the railways. In order to support their demands they have had to criticise shortcomings of railway management; and some of them have voiced criticisms which have been regarded, at least by railway managers, as improper and unjust. This past attitude of the commission has created the impression in many minds that it is its business constantly to attack and harass the railways. So when Mr. Knapp got up and outlined a constructive policy, not for further extending the commission's regulatory authority, but for protecting the railways and fostering their development, the shippers, whose idea of the commission's duty appears to be that it ought always to decide cases in favor of the shippers unless the railways prove their case beyond a reasonable doubt, began to assail Mr. Knapp as unfair. His Railway Business Association speech was rather favorable to the railways, but if there was any impropriety in making it we can cite scores of instances where other members of the commission have been guilty of far greater improprieties. As a matter of fact, the commission is an administrative as well as a judicial body. As an administrative body, it is not only its right but its duty to consider not merely what is a constitutional policy of regulation of railways but also what policy is in the interest of the public welfare; and its members have as much right to have opinions on this phase of the subject and to express them as have members of Congress, from which body the commission derives its delegated administrative powers. The shippers are quite willing to have the commissioners remember that they are members of an *administrative* body when they think that railways ought to be denounced or prosecuted, but they want them to consider themselves members of only a *judicial* body when they are disposed to say anything favorable to the railways.

Mr. Knapp is the ranking member of the commission in point of service, having been appointed in 1891, while Commissioner Clements, who ranks next in point of service, was appointed the

next year. He has been a vigorous advocate of the various acts that have been passed to extend the regulating authority of the commission.

Of his great and peculiar qualifications for chief justice of the Commerce Court, there can be little question. He is a lawyer by profession. His public utterances show that he is not a mere case lawyer, but that he is a philosophical lawyer who honors the degree of LL.D. conferred on him by by his Alma Mater in 1892. While the commission is an administrative body, it is also in a very important sense a judicial body. Its main function is the determination of reasonable rates, and the courts have held that this is distinctly a judicial function. The Interstate Commerce Commission, not only in regulating rates but in regulating other phases of the railway business, constantly runs close to, if it does not encounter, various constitutional limitations. In this fact is to be found the only justification for the commission having in the past been mainly composed of lawyers. But a knowledge of law without a knowledge of political science, political economy and practical railway affairs does not fit a man for a member of the Interstate Commerce Commission. He has to acquire these other kinds of knowledge if he is to be a fit commissioner. Mr. Knapp has acquired and possesses these various kinds of learning to a degree exceeding perhaps any other man in the United States. Now, these are the very kinds of knowledge that are requisite to equip for membership on the Commerce Court, for this court is to hear only appeals from the Interstate Commerce Commission. Besides the requisite equipment of knowledge acquired by such an experience, Mr. Knapp has to a marked degree the judicial temperament and the ability to write clear, forcible English.

Balthasar Henry Meyer, who succeeds Mr. Knapp as a member of the Interstate Commerce Commission, is one of the best equipped men for his duties ever appointed to the commission. Perhaps he is the best equipped. He was a profound student of and an interesting, learned and fair writer on railway economics and government regulation of railways for years before he was appointed in June, 1905, a member of the railway commission of Wisconsin. After serving two years on the commission he was appointed in 1907 to succeed John Barnes as its chairman. As a member and as chairman of the Wisconsin commission, he has done work which has merited and received the warmest praise from shippers, railway officers and the public.

A good many officers of the railways operating in Wisconsin differ from him in their theoretical opinions regarding the way that railway rates ought to be made and regulated. Mr. Meyer goes farther in advocating the cost of service theory of rate-making than they can follow him. But they recognize the fact that in him the state of Wisconsin has had a railway regulating official who, in the performance of his duties, has been influenced only by what as an economist and a statesman—for he deserves the name—he has believed to be lawful and in the interest of public policy; that he never put his ear to the ground before rendering a decision to find out if it would further his political ambitions, because he had no political ambitions; and that rather than render what he believed an unfair decision he would quit the commission. Recognizing him to be this sort of regulating official, and finding that whenever he wrote an opinion for the commission he always gave some sound and usually conclusive reasons for the decision at which he arrived, the railways generally have accepted decisions when he wrote the opinions, even though they considered them much too unfavorable to the roads. It is often said of the Interstate Commerce Commission, both by railway officers and shippers, that it is a political body. If this has been true in the past, it is apt to be less true so long in the future as Mr. Meyer belongs to it. While he has specialized on railway economics, he has an international reputation in the entire broad field of economic investigation and writing. The Interstate Commerce Commission heretofore has been composed almost entirely of lawyers. It will be refreshing and valuable to have in its membership a leading political economist.

C. C. McChord, who has been appointed an Interstate Commerce commissioner, succeeding Francis M. Cockrell, served for a number of years as chairman of the Kentucky Railroad Commission and was defeated for re-election to the commission in the fall of 1907. If one were to judge entirely from Mr. McChord's speeches during his campaign for election to the office of railway commissioner, he would get the impression of a radical, strongly antagonistic to railways; but, as a matter of fact, this is a quite erroneous impression. Mr. McChord's speeches were for political purposes. Without doubting the sincerity of the man, it is nevertheless true that his attacks on railways were all made in the heat of political controversy, while as a commissioner he was always honest and, on the whole, just. He is a man of strong opinions, with strong likes and dislikes. When once convinced of the rights in a given case he is apt to disregard further argument and to uphold what he believes under all circumstances. Mr. McChord is an able lawyer, but hardly a man of a judicial turn of mind. He is a practical man, with little of the student, but with a great deal of native shrewdness. While he was chairman of the Kentucky commission, the Kentucky legislature passed a long and short haul clause worded almost exactly like the amended long and short haul clause in the Interstate Commerce Act. The question of its enforcement was left to the discretion of the railway commission, and under Mr. McChord the commission decided to allow more to be charged for a short haul than a long haul in a multitude of cases where competition was effective at specified points, although in general the principle of the long and short haul prohibition was enforced. After Mr. McChord failed of re-election to the commission, he entered private practice, and his firm were attorneys for the railways in the cases in which the long and short haul clause was almost entirely nullified by the railway commission. The railways in Kentucky, while fighting Mr. McChord politically, felt that he was, on the whole, just, and aside from the question of his politics, an able man. He is familiar with the theory and practice of rate making, and his views have usually been held to be sound. When he was chairman of the Kentucky commission, the coal operators raised the price of coal to dealers by 25 cents a ton, and the railways, in an effort to stimulate the consumption of coal, reduced the freight rate by 80 cents a ton. The local dealers made no reduction in the retail price, and this fact was called to Chairman McChord's attention by the railway companies. He not only brought considerable pressure to bear on retail dealers to compel them to reduce their prices, but in his speeches through the state he gave full credit for the lower prices to the railway companies. Mr. McChord has been active in the National Association of Railway Commissioners and brings to his work on the Interstate Commerce Commission a fairly long and varied experience in dealing directly with railway regulation.

RAILWAY ATTITUDE TOWARD VALUATION OF RAILWAYS.

PRESIDENT TAFT renewed in his annual message his recommendation for an appropriation to enable the Interstate Commerce Commission to make a valuation of railways. There probably will be little or no opposition to this by most railway managers. They are not converts to the plan of using physical or any other kind of valuation as a basis for rate-making or regulation. They merely have decided that, in view of the state of public opinion and the attitude of railway regulating authorities, it will be better for the roads for their managers to coöperate in getting a valuation fairly made and fairly used than to oppose any kind of valuation at all, with the probable result of having one unfairly made and unfairly used.

If a mere physical valuation were made and there were an attempt to base all rates on cost of service, including proportionate parts of operating expenses, fixed charges and dividends, one of two things would result: The Supreme Court of the United States would hold the valuation worthless and the attempt to fix rates on it unconstitutional, or the business of the country, including that of the railways, would be demoralized. This is generally recognized now by those who have given special study to the subject. In their opinion a valuation could be used, not

as a measure of the reasonableness of specific rates, but merely as a measure of the reasonableness of the total return derived by a railway from its entire business. Railway men are confident that a fair valuation would show that the average return has been and is very much smaller in proportion to the actual value of the roads than is popularly supposed.

While railway managers probably will not oppose all valuation of railways, they ought to try to see that any legislation that may be passed is fairly and intelligently drafted. One of the just criticisms made against most of those whom the roads have sent to represent them at state capitals and at Washington has been that they usually have opposed any legislation affecting railways instead of furnishing to the lawmakers information and ideas that would enable them, if some legislation were going to be passed in any event, to make it fair and beneficial, or, at least, as nearly so as practicable. It is evident that some form of federal legislation for valuation of railways is practically inevitable sooner or later, and this affords the officers of the railways a chance for constructive work. In providing for a valuation Congress may decide to direct in more or less detail how it shall be made. If so, the lawmakers should be clearly shown that if they want an appraisal that will be worth anything they should not provide for a mere *physical* valuation. There has been a great deal of agitation for physical valuation; but there is no warrant for it in the decisions of the United States Supreme Court. In the case of Smyth *v.* Ames the court indicated beyond all peradventure that in ascertaining the "true value," which it said was the basis for all calculations as to the reasonableness of rates, consideration must be given to each and every factor that enters into the value of a railway as a going concern. It specifically mentioned not only the original cost of construction and of permanent improvements, and the cost of reproduction, but also the amount and market value of stocks and bonds outstanding, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses. It added, "We do not say that there would not be other matters to be regarded in estimating the value of the property." Railway representatives should insist on consideration being given to all these factors; not because there is ground for fear that a mere physical valuation would be less than their capitalization—for we think most railway men believe a physical valuation would exceed the total net capitalization—but because less than this would be unfair and because the Supreme Court has indicated that it is the only way to get a legal basis for calculating the reasonableness of rates.

One of the questions that will arise, either when Congress is framing the valuation bill or when the Interstate Commerce Commission is making its plans for conducting the valuation, will be as to whether the railway is entitled to have considered the "unearned increment" in its right-of-way and terminals. The Minnesota commisison, when it made its valuation, contended that the railway is not entitled to any return on its unearned increment. The Interstate Commerce Commission in at least one case referred to this as a doubtful matter. It is desirable to make clear to Congress and to the commission that it is not at all doubtful. The Supreme Court of the United States, in the case of Wilcox *v.* Consolidated Gas Company (212 U. S. 19), said:

> "There must be a fair return on the reasonable value of the property at the time it is being used for the public. * * * And we concur with the court below that the value of the property is to be determined *at the time* that the inquiry is being made regarding the rates. *If the property which legaly enters into the cosideration of the question of rates has increased in value since it was acquired, the company is entitled to the benefit of such increase.*"

The decisions of the court plainly indicate that if valuations of public utility corporations are made they must be made for the protection of the corporation as well as for the protection of the public. Indeed, the valuation theory was originated by the Supreme Court, not as a means of keeping the railway from earning more than a "fair return," but of protecting it from being restricted to less; and there has been no decision in which it has been held that rates otherwise reasonable may be reduced because in the aggregate they yield more than the so-called fair return.

There are still many persons who think a valuation should take into account only the original cost of construction, or only the cost of physical reproduction, without any allowance for unearned increment, and that then all rates should be so fixed that each would cover operating expenses and a mathematical proportion of fixed charges and dividends, the total return on the valuation not to exceed 5 or 6 per cent. If public opinion demanded that a valuation be made and used in this way, past experience shows that it might get its will. If it did the valuation and the rates based on it sooner or later would be invalidated by the courts. But before this could be accomplished an enormous amount of harm could be done. Therefore, it is necessary to educate the public on the subject of valuation and its relation to rate-making, as well as the lawmakers and the commission.

Letters to the Editor.

LANTERN TESTS FOR COLOR PERCEPTION.

To the Editor of the Railway Age Gazette:

In your issue of November 18 there is an excellent paper by Dr. G. H. Taylor, of the New South Wales government railways, on tests for color vision in New South Wales. There is one statement in it, however, which needs correction. He says "owing to the disks moving in a regular sequence the colors in the Williams lantern could be learned by a person with defective color sense." This depends entirely on how the lantern is used.

There are eighteen colors in the disk, each numbered, and the disk can be rotated forward or backward as desired. It is not necessary to start the examination with number one, for the colors can be shown, beginning with any number. While covering the openings of the lantern with the hand the disk can be moved forward or backward, and when the colors are again shown, by removing the hand, the regular sequence is broken. In this way the lantern can be so used that the colors cannot be memorized.

The lantern which Dr. Taylor refers to as the "old Williams lantern" is the model of 1903, which is also used on a number of the railways in America. The last model, that of 1909, shows one, two or three lights at one time, but the colors and their numbers are the same as in the model of 1903. The intensity of the color varies with the different pieces of glass, or it can be changed by altering the intensity of the electric lights in the lantern by a rheostat in their base.

Experience has shown that it is essential in a proper test with lights for acuteness of the color sense to have a contrast of colors. This corresponds more closely to the conditions of actual service, for often a signal bridge will have several reds or greens showing at one time, and when an engineman comes into a large yard, at night, it is very necessary that his color sense should be good in order to pick out the signals governing his track from the many lights shown in the yard, and to recognize their color quickly and accurately. With the model of 1909 lantern 54 different combinations or single colors can be shown, as follows:

1 (1) Red 2 (2) Green 11 (3) Red 12 (4) Green 3 (5) Red 4 (6) Green 13 (7) White 14 (8) Red 5 (9) Red 6 (10) Yellow 15 (11) Green 16 (12) Red or purple 7	1 17 (19) Red and Red 2 18 (20) Green and Blue 11 9 (21) Red and Green 12 10 (22) Green and White 3 1 (23) Red and Red 4 2 (24) Green and Green 13 11 (25) White and Red 14 12 (26) Red and Green 5 3 (27) Red and Red 6 4 (28) Yellow and Green 15 13 (29) Green and White 16 14 (30) Red and Red 7 5	1 9 17 (37) Red, Green, Red 2 10 18 (38) Green, White, Blue 11 1 9 (39) Red, Red, Green 12 2 10 (40) Green, Green, White 3 11 1 (41) Red, Red, Red 4 12 2 (42) Green, Green, Green 13 3 11 (43) White, Red, Red 14 4 12 (44) Red, Green, Green 5 13 3 (45) Red, White, Red 6 14 4 (46) Yellow, Red, Green 15 5 13 (47) Green, Red, White 16 6 14 (48) Red, Yellow, Red 7 15 5

(13) Blue	(31) Blue and Red	(49) Blue, Green, Red
8	8 6	8 16 6
(14) Red	(32) Red and Yellow	(50) Red, Red, Yellow
17	17 15	17 7 15
(15) Red	(33) Red and Green	(51) Red, Blue, Green
18	18 16	18 8 16
(16) Blue	(34) Blue and Red	(52) Blue, Red, Red
9	9 7	9 17 7
(17) Green	(35) Green and Blue	(53) Green, Red, Blue
10	10 8	10 18 8
(18) Smoke or white	(36) White and Red	(54) White, Blue, Red

In the lantern disk there are seven reds of different shades (the red of No. 1, No. 5, No. 8, etc., is not a repetition of the same color); also five greens of different shades, but not so marked as with the reds; two blues, one purple, one yellow, one smoke, and one uncolored glass. These colors and their numbers are the same as in the model of 1903, and many of the colors are glass cut from the roundels used in railway service, and, as before stated, the order in which the colors and their combinations can be shown can be varied at will.

Dr. Taylor's report of the results of his tests, giving the number of cases of defective color sense found in 12,000 examinations, is very interesting. He says "of these 4.92 per cent. were found to have defective color sense; classified as red blind 2.16 per cent.; green blind .12 per cent.; incomplete color blind 1.12 per cent.; and feeble color sense .41 per cent.; and 1.12 per cent. failed only in the lantern, the failures in the lantern being subsequently confirmed by Nagel's method."

If we add together the numbers in the first five items, in which apparently both the Holmgren worsteds and the Williams lantern were used, we have:

Red blind	2.16	per cent.
Green blind	.12	"
Incomplete color blind	1.12	"
Feeble color sense	.41	"
	3.81	"

This gives us a total of 3.82 per cent. defective in their color sense, and this is a singularly complete confirmation of the figures which Holmgren published years ago, when he stated that as the result of the examination of 32,165 men he found 3.25 per cent. color blind. The other interesting fact which Dr. Taylor brings out is that 1.12 per cent. showed their defect only with the lantern test, and this figure added to the above 3.81 gives his figure of 4.92 per cent. of defectives.

In the last paragraph of his paper Dr. Taylor states that with the old lantern .42 per cent. were found defective in color perception who had not been discovered with the Holmgren test, and with the new form of lantern and greater care in using it this percentage was increased to .7 per cent.

The Holmgren worsted test, when properly used, gives us some information in regard to the color sense that we do not get with the lantern and its use should be continued, but in addition to the worsted test we need to use a lantern test in order to discover all the cases of dangerous defect in the color sense.

CHAS. H. WILLIAMS,
Consulting Oculist, Southern Railway,

ONE WAY TO FACILITATE THE FLOW OF TRAFFIC THROUGH TERMINALS.

November 28, 1910.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

When freight traffic is heavy its movement on railways has been likened to forcing a 3-in. stream through a 1-in. nozzle. During just such a period the Interstate Commerce Commission, after investigating transportation conditions as they existed in the Northwest, summed up the situation in these words:

"There is no division among railway men, so far as appears, as to the necessity for greatly increasing terminal facilities and for adopting new methods of handling freight at the larger terminals. *The congestion of traffic* arises not at point of origin but at points of destination or *at terminals where freight is transferred from one line to another.* This congestion has its effect upon all lines of railways reaching such terminals, for once a terminal contains more traffic than it can promptly handle and deliver it acts as a dam which floods a constantly increasing area behind it."

What was true in the Northwest obtained elsewhere. What obtained throughout the country in 1906 and 1907 will occur again; at least, there is no reason to doubt it, since no pronounced changes have been made either in facilities or methods. Within the last few months one of the foremost railway presidents has given expression to the belief that the terminal problem is perhaps the most important of the many problems that are waiting to be solved. It is essential, therefore, that railway men be on the alert to devise ways out of what is becoming an exceedingly serious situation.

It is a growing conviction that, as a means to facilitating the movement of cars, the M. C. B. defect card should be abolished. Even those who are wedded to the defect card system are willing to accept a change provided a better way is devised to safeguard the interests of the borrowers and the lenders of rolling stock. Post-mortems must be held daily over the bodies of the trucks of 250,000 vehicles of transportation. The defect card is the certificate which sets forth the verdict of the jury.

If a train or a car moves on a single railway for 1,000 miles inspections are made to insure safety, and for that alone. If the train or the car moves an equal distance over half a dozen lines it is inspected over and over again to protect the lender and borrower lines against each other. Little wonder, then, that the investigation made in 1906-07 brought out the statement that "the congestion of traffic arises at terminals where freight is transferred from one line to another." To overcome this difficulty we are begged to stop stopping cars in transit; or, if we must inspect for anything but safety, we are implored to conduct our "protection" inspection in a less important spot than the point of interchange.

The car owner says: "I am anxious to join in overcoming delays to cars and freight, but in doing so why should I assume responsibility for my car when the borrower wears it out?" And the thought is good. But the borrower does pay him, and because the owner does not know it he asks the borrower to pay him again. And the borrower does so without knowing that his obligation is already cancelled. This rental grew out of the fact that a distinguished body of five railway officers, acting under instructions from the American Railway Association, analyzed the cost of owning a freight car, to arrive at a figure which would be proper for rental purposes; and from the mass of figures gathered covering the years 1902 to 1907, inclusive, they deduced the following:

Item.	Cost in cents per day.	Cost per year.
Interest, 5 per cent	9.12	$33.28
Taxes	.61	2.25
Depreciation	5.71	20.84
Maintenance	14.42	52.61
Incidentals	4.56	16.64
Total	34.42	$125.62

It is true these presidents did not agree respecting each item, but they did agree on one thing, namely, that through a per diem rental of 35 cents the borrower pays the owner interest, taxes, insurance, depreciation (they call it replacement) and repairs. It is this last item to which attention is specially directed, for whether the repairs are light or heavy, whether due to fair or unfair usage, without regard to when or how the damage may have taken place, whether by wreck or otherwise, the borrower, through the 35-cent per diem rate, pays the owner for all these things. After payment for all repairs, on what theory may a second payment be demanded?

Bills for repairs are rendered because M. C. B. rules permit it, and are paid because these rules require it. But what M. C. B. rules permit and require were determined before the framers knew that the car owner received through the rental rate pay for all repairs. They could not have known of this until recently, as the information was promulgated only last year—in November, 1909, to be exact. In further justification of M. C. B. rules, it should be remembered that at the time the information gathered by these five presidents, acting as a commission, was given out, the per diem rate was less than it is now.

Up to this time the per diem rate as a factor in framing M. C. B. rules has not even been considered; indeed, those who frame such rules have had no means of knowing exactly what elements do enter into the car rental. With the information now at hand, the situation changes.

Two of the five presidents urged in a minority report that the per diem rate should not include the amount which the borrower is required to pay through the M. C. B. rules. Perhaps they

thought it would be easier to omit it from the car rental rules than to remove it from the Master Car Builders' rules. It is not reported, however, that a removal from the M. B. C. rules was even contemplated. The remaining three urged in a majority report that the cost of repairs be included in the per diem rental. Perhaps they felt it would be proper to require the borrower to pay the same obligation twice; but is it not more likely that they realized a change in M. C. B. rules is on the way?

It is fortunate that the minority urged so strongly the complete injustice of a double charge. It is equally fortunate that the majority succeeded in including in the car rental rate the entire repair expense. The minority, by aiding in striking out of the M. C. B. rules this one requirement, will have won its point. And the majority, by aiding also in this direction, will have justified itself. Both will have aided in bringing about in a simple and inexpensive way an improvement of enormous magnitude.

In times past, when the borrower paid the owners scarcely enough to cover ordinary wear and tear, to say nothing of depreciation, taxes and interest on the investment, it was found absolutely necessary to increase the owner's responsibility for repairs. This was done to lessen the congestion in terminals which was being caused by extremely technical inspections when cars passed in interchange.

That such extensions of the car owner's responsibility greatly improved conditions, all agree. But, at the time, the idea was vigorously combated. If, then, the extension of owner's responsibility could be justified when the borrower did not completely remunerate the owner, either through M. C. B. rules or car rental rules, surely a further extension can also be justified, now that the borrower does remunerate the owner through the rental.

Even as the rules now stand, the owner pays, through M. C. B. rules, upward of 85 per cent. of the cost of repairs occurring on foreign lines, leaving the borrower only the remaining 15 per cent. to pay. And in order to fasten this 15 per cent. upon the borrower, all the money thus secured is and of necessity *must* always be expended to hire men to inspect cars for "protection" —not protection of human lives, but protection respecting repair bills.

The protection inspectors who swarm at points of interchange cannot earn their wages unless they delay traffic and congest terminals. Cars by the hundreds of thousands are suffered to be interfered with in their daily flow through terminals, not that their journey may be made safer, but that the borrower may be required to pay money through M. C. B. rules that he has already paid through per diem rules. Every defect card which a borrower puts on a car that he is sending home is equivalent to making the second payment of a discharged debt.

Can any thinking man justify the act of holding a train or a car in a crowded terminal—and all terminals are crowded—for an inspection respecting anything but safety? This practice of slowing up the movement of traffic, however unfortunate it may be, could not be complained of if there were not other ways of protecting the interests of the car owner and car borrower. But there is another way. The car owner is already protected, and that without interfering in the least with the flow of traffic.

The so-called "protection" inspection as now conducted at over 5,000 cities and towns in this country where cars are interchanged should be abolished and the M. C. B. defect card should be thrown away. The army of "protection" inspectors employed in these 5,000 cities and towns should be put to work inspecting for "safety" of human lives, under instructions to forward "safe" cars and to shop "unsafe" ones.

If M. C. B. rules as at present framed surround the borrower and the lender with sufficient protection in car repair settlements amounting to $25,000,000 each year, they are ample to cover the situation after the suggested change is made. If the strain on M. C. B. rules as at present drawn is too great, let real "protection" inspectors be employed and stationed not at the points of interchange where cars should move quickly, but at the points of repair, where they are of necessity at a standstill.

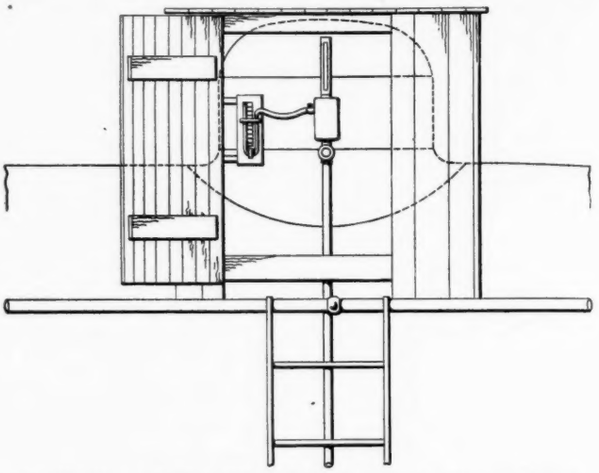
OPERATING MAN.

QUALITY OF STEAM AND FACTOR OF EVAPORATION IN LOCOMOTIVE TESTS.

BY J. E. GARDNER AND L. W. WILSON.

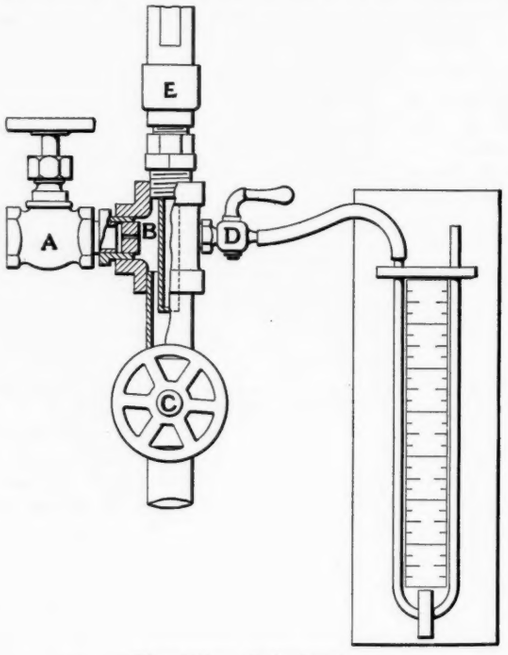
Chicago, Burlington & Quincy, Aurora, Ill., and West Burlington, Iowa.

To compare the performance of different locomotive boilers, or in fact of any boilers, it is necessary to compare the amount of heat that is actually utilized for turning the feed water into



Application of Throttling Calorimeter to Steam Dome.

steam at the boiler pressure. The most common way of expressing this is by determining in each case the equivalent evaporation from and at 212 deg. Fahr., that is, the pounds of dry steam per hour that would have been produced had the same amount of heat been used to turn feed water at 212 deg. into steam at atmospheric pressure. It is to simplify the calculation of this quantity that the accompanying curves have been worked out.



Throttling Calorimeter.

Were it not for the quality of the steam, the reduction of the actual number of pounds of steam evaporated in a given locomotive boiler to the equivalent evaporation from and at 212 deg. would depend on just two things, the temperature of the feed water and the boiler pressure. While the steam pressure may be read from the gage and the temperature of the feed water may be obtained from a thermometer in the tank, the determina-

tion of the quality of the steam is not such a simple matter and requires special apparatus.

In a number of locomotive tests careful experiments were made to determine the quality of the steam. The apparatus consisted of a throttling calorimeter made of pipe fittings, such as was originally designed by Professor R. C. Carpenter, of Cornell University, and shown in the accompanying drawing. Steam from the boiler enters the calorimeter through the valve A and a 1/16-in. hole in the plug at B and is then discharged to the atmosphere through the valve C. The pressure in the calorimeter is determined by a mercury manometer at D and the temperature by a thermometer in the thermometer cup E. The calorimeter was tapped into the steam dome of the locomotive at a point opposite the throttle valve in order to receive steam of the same quality as that which went to the cylinders. As this placed the calorimeter in a decidedly exposed position the utmost precautions were necessary to obtain correct results. In the first place the pipe leading from the boiler to the calorimeter was made as short as possible, and together with the calorimeter was carefully lagged. Even then the radiation loss was too great for accurate results. The next step was to build a wooden box around the calorimeter and the steam dome; the calorimeter was thus protected as well as it would be in a test of a stationary boiler.

In order to prevent any inaccuracy due to calculating the temperature of the steam in the boiler from the boiler pressure and to further correct any radiation loss in the calorimeter, the calibrated thermometer in the calorimeter was used for this purpose. With the outlet valve C and the cock D closed, the inlet valve A was left open, thus supplying steam to the calorimeter at boiler pressure. When the temperature has become constant, it was noted, and the valve C was opened and also the cock D. As soon as the temperature had become constant again the thermometer was read and also the manometer pressure. Between readings the valve A was left open in order to keep the calorimeter heated.

After comparing the results of a long series of tests made on the Chicago, Burlington & Quincy in 1905-1906 it was found to be safe to assume a quality of steam of 98.5 per cent. in usual practice with a well-designed non-superheater locomotive boiler; hence the use of this valve in figuring the factors of evaporation shown on the accompanying diagram.

Following are the necessary formulæ for determining the quality of steam by the throttling calorimeter and also the factor of evaporation. Professor Cecil H. Peabody's steam tables were used and the symbols are the same as used with those tables. To determine the quality of steam by the throttling calorimeter:

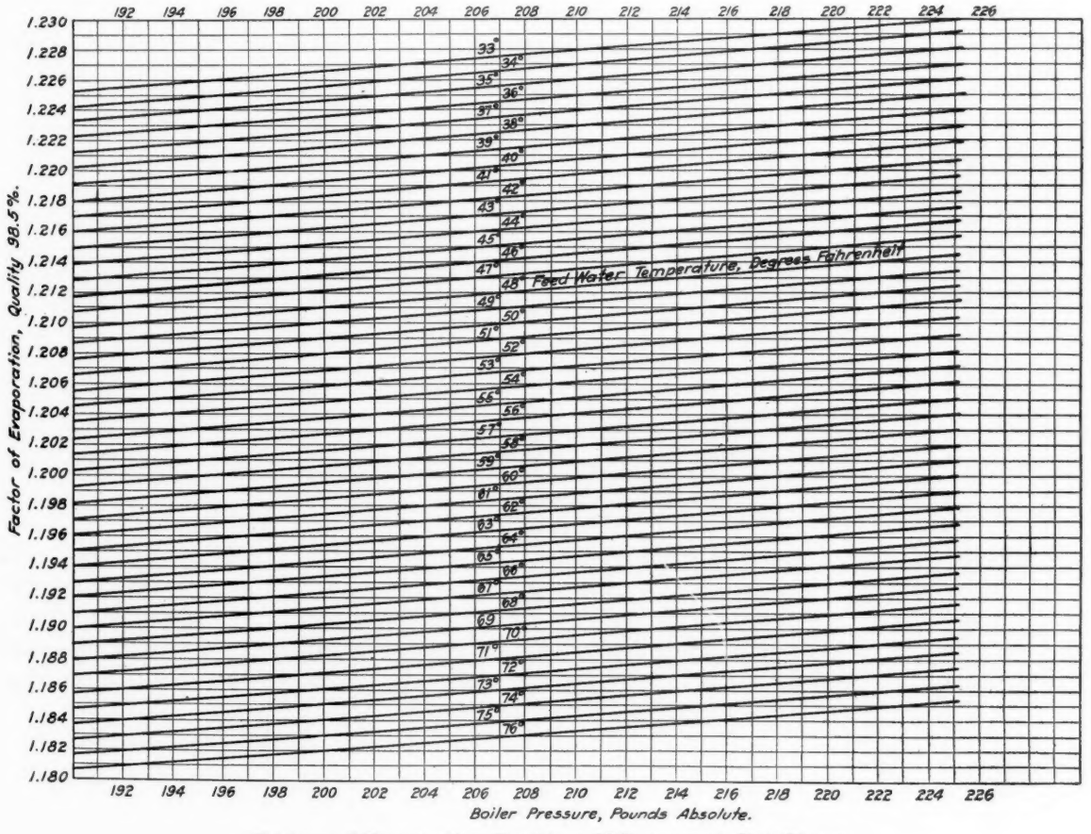
Let X = the quality of steam in the boiler.
t = the temperature of steam in the boiler.
t″ = the temperature of the superheated steam.
q = "heat of the liquid" of steam at temperature t.
r = latent heat of steam at temperature t.
(This is the temperature in the calorimeter when the outlet C is open.)
p′ = the manometer pressure reduced to pounds per square inch.
t′ = the temperature of saturated steam at pressure p′ (from steam tables).
q′ = "heat of the liquid" of steam at pressure p′.
r′ = latent heat of steam at pressure p′.

$$X = \frac{q' + r' - q + 0.48\,(t'' - t')}{r}$$

The factor of evaporation, a number which if multiplied by the actual evaporation of a boiler will give the equivalent evaporation from and at 212 degs. is determined as follows:

Let q = "heat of the liquid" of steam at the boiler pressure.
r = latent heat of steam at this pressure.
q_1 = "heat of the liquid" of the feed water.
x = quality of the steam, here equal to 0.985.
r° = latent heat of steam at 212 deg. Fahr. = 965.8.

$$\text{Factor of Evaporation} = \frac{q + xr - q_1}{r^\circ} = \frac{q + 0.985\,r - q_1}{965.8}$$



Factors of Evaporation Based on 98.5 per cent. Dry Steam.

About $185,000 has been appropriated by the Brazilian government to pay for the building of the Itacurussa branch of the Central Railway of Brazil, and about $365,000 has been appropriated for extensions and additions on the Western Railway of Minas.

AUTOMATIC BLOCK SIGNALS ON THE WASHINGTON WATER POWER COMPANY'S RAILWAY.

The Washington Water Power Company, of Spokane, Wash., operating high speed interurban electric railways, has equipped 20 miles of its lines, single track, with automatic block signals, controlled by track circuits, and arranged in accordance with the best modern practice; and in connection with the signals an automatic stop is provided—the first permanent automatic stop installation which has been made on a surface railway in America, if we except the stops of the Harrington system which have been in service for two or three years on the Northern Railroad of New Jersey, near New York City, which installation is in some sense experimental. In the Washington installation the signal arm is on the *left* of the post and moves in the upper quadrant. These arms are the regular form generally used in the upper quadrant signals, not pivoted at or near the centre as in the case of the signals on the New York, New Haven & Hartford, which are partly left-hand and partly right-hand. The automatic stop apparatus, which is shown in Figs. 3 and 4, is very simple. It consists of a horizontal iron rod, connected to the fixed signal, and a vertical glass tube on the car. If the rod strikes the tube, the glass is broken and by this means the air is exhausted from the brake pipe and the brakes of the cars are applied.

The following details of this installation were furnished by R. A. Willson, general superintendent of railways of the Washington Water Power Company.

The road equipped is about 20 miles long, single track, extending between Spokane and the towns of Medical Lake and Cheney. Before contracting for the work Mr. Willson made a thorough investigation and he gave the contract to the General Railway Signal Co., of Rochester, N. Y. There are 25 home and 4 distant signals. The location plan, Fig. 1, shows the whole of the lines signaled, except about three miles at the east end.

In considering the signaling schemes usually adopted for electric lines, Mr. Willson concluded that they were unsatisfactory, and that the additional cost of a complete installation, with track circuits, was warranted. The trolley contacting and car counting devices ordinarily used are incapable of protecting against a car accidentally moved afoul of the main line, and were found to be subject to annoying disarrangements in operation.

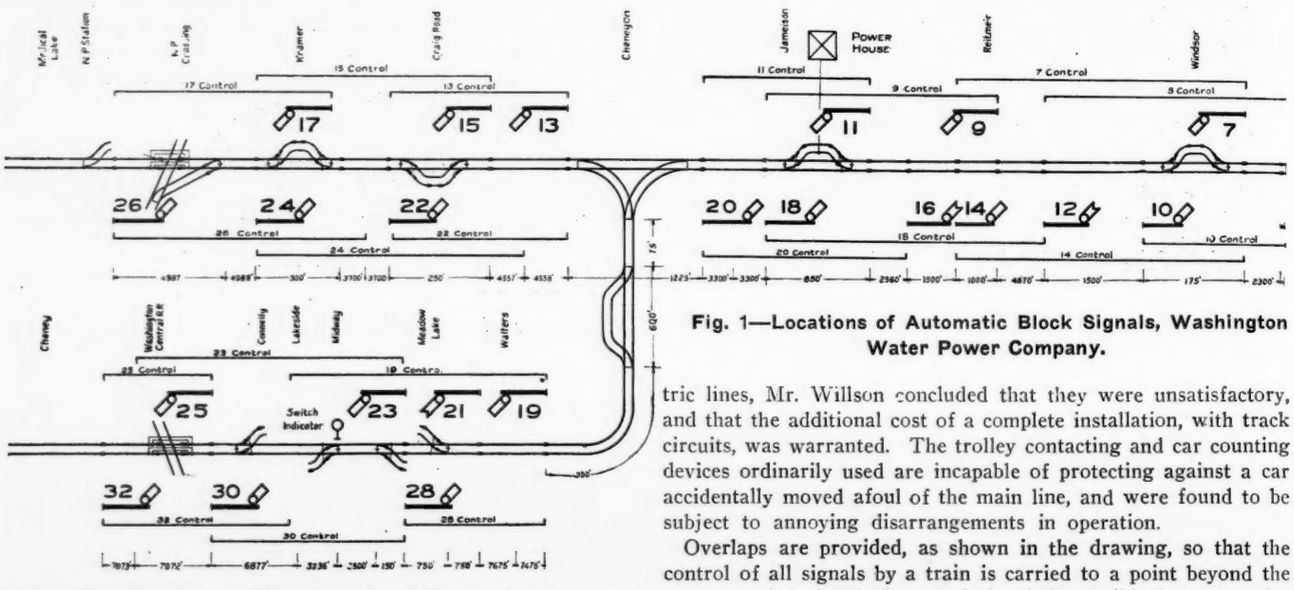


Fig. 1—Locations of Automatic Block Signals, Washington Water Power Company.

Overlaps are provided, as shown in the drawing, so that the control of all signals by a train is carried to a point beyond the next opposing signal, thus rendering it impossible for two trains approaching each other to meet without one of them receiving a stop signal at least one block away from the other, and providing two stop signals in the rear for the government of following movements.

The signaling equipment consists entirely of the General Railway Signal Company's standard apparatus, and includes the Model 2-A top-post mechanism, polyphase relays, and iron core reactance bonds. The cars are operated by 600 volt direct current, and alternating current is used for the signal track circuits.

The propulsion current is obtained from motor-generator sets supplied from a 60,000 volt, 60 cycle line.

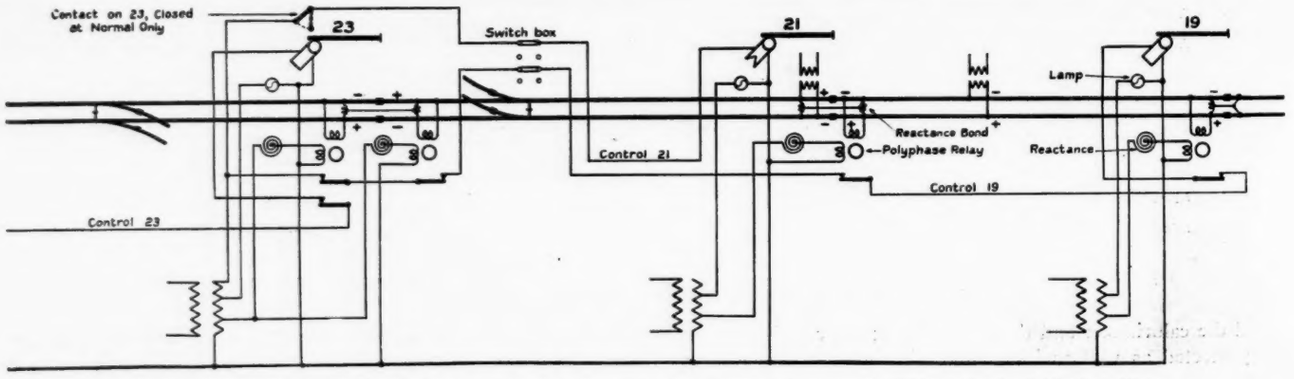


Fig. 2—Automatic Block Signals on Washington Water Power Company's Line; Typical Wiring Plan.

Postscript.—The control wire of distant signal No. 21 should have been shown as running through the points of the track relay of the track section between Signals 21 and 23.

Current is available at the Jamieson sub-station in approximately the center of the district to be served, and is delivered to the bus bars of the signal switchboard at 2,200 volts, whence it is distributed to the signal transmission lines.

Transformers stepping from 2,200 volts to the various voltages required are placed at each signal and track feed location. High tension lightning arresters are installed at half-mile intervals for protection against electrical storms.

Oil cooled Model H transformers are used throughout. In-

dependent secondary windings are provided for each track circuit and for the signal-operating, lighting, and relay local circuits. Grid resistances are provided for limiting the current flow to the track when the rails are short circuits.

The track secondary windings are provided with taps ranging from one to five and eight volts for the requirements of varying lengths of track sections; the signal secondaries provide 220 volts for signal operation with taps of fifty-five volts for signal lighting and of twenty-eight volts for the relay local windings; all of which taps are taken to a terminal board for convenient connection to the external circuits.

The polyphase relay used is a two-phase induction-motor, one

Figs. 3 and 4—Automatic Block Signals, Upper Left-hand Quadrant, with Automatic Train-Stop.

phase of which is energized from a transformer located at the relay, and the other through the track circuit, which is energized by a transformer located at a distance. The efficiency of these relays is shown by the fact that, in this installation, they are operating on continuous track sections, that is, track circuits without cut sections, over 15,000 feet long, and the conditions

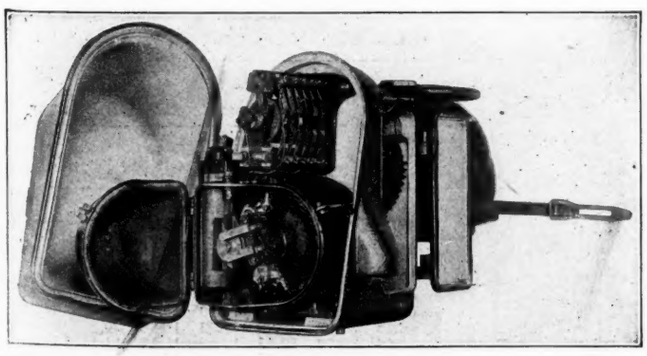


Fig. 5—Semaphore Signal Mechanism, Model 2 A, Made by the General Railway Signal Company.

as to ballast and track leakage are not the best. This length of continuous track section has never before been equalled, or even approached, in the signaling art.

In these relays motion is transmitted from the rotor to the contacts by means of a trundle pinion engaging with a segmental gear mounted on a shaft, which latter is connected to the contact bar by a crank. Friction is reduced to a minimum by the use of ball bearings for all rotating parts. The contacts rub through the last 1/16-inch of their travel, being thus self-cleaning.

Two-rail track circuits are used, arranged so that both rails are available for the returning propulsion current. Sixty pound A. S. C. E. steel rails are used for the tracks, which are divided into block sections of from 175 feet to 15,150 feet.

The signal mechanisms are clamped to the posts and are arranged for 45 degree travel of the arm in the upper left-hand quadrant.

The mechanism, Fig. 5, is operated by a series wound commutating alternating current motor, designed so that it gives a sparkless operation. The current consumption is low. It will be seen by Fig. 2 that the transformer from which the signal receives its power is located one block in advance, a distance varying from 175 feet to over 15,000 feet, and that the signal is operated directly over this line without the use of a line relay. In one case, the control is about seven miles away, No. 10 copper being used for both control and common wires—that is, the signal is operating successfully through a total line resistance closely approximating 74 ohms.

A centrifugal governor is provided on the end of the armature shaft for controlling the speed of the motor and preventing the signal from over-running its position; the contacts are in series with the motor and are shunted during a portion of the movement, so that the speed control does not become effective until just before the signal arm reaches the proceed position.

The motor is geared directly to the semaphore shaft and holds the signal in the clear position through the medium of a reactance which is switched into series with the motor by the action of the circuit breaker at the end of the clearing movement. The signal returns to the stop position by gravity. The direct gearing of the motor to the semaphore shaft, and the holding of the signal in the clear position by the motor, render the use of a slot or a dash pot unnecessary and thereby eliminate these troublesome features.

The circuit breaker is a complete unit. It is connected directly to the semaphore shaft by means of segmental gears, and is pro-

vided with individually adjustable contacts for the control of 12 circuits, including the local control of the signal.

AUTOMATIC STOP.

All of the motor cars of the system are provided with three glass tubes, mounted, in a vertical position, as shown in Figs. 3 and 4, wherein we have retouched the negative so as to more plainly indicate the position of the tube. Each signal is provided with an auxiliary arm which is connected to, and operated in unison with, the signal arm, and is set at such a height that when the signal is in the stop position the tube on any car passing will strike against and be broken by the arm. The breaking of the tube results in a semiservice application of the brakes; and the brakes cannot be released until the broken tube is replaced. The trainmen have to make a strict accounting for tubes used, and this forms an effective check on the observance of signals.

Means are provided on each signal post whereby in the event of any disarrangement of the signal system the stop arm may be raised by hand for the passage of a car; this can be accomplished only by the insertion of a key in a lock provided for the purpose, which key cannot be removed until the arm has been restored to the normal position.

EARNINGS AND EXPENSES OF TWELVE WESTERN LINES.

The accompanying very interesting table giving the gross earnings, net earnings, maintenance charges and transportation expenses of 12 western railways for the five-year period ending with 1905 compared with the five-year period ending with 1910 was prepared by T. A. Polleys, tax commissioner of the Chicago, St. Paul, Minneapolis & Omaha, St. Paul, Minn. The 12 roads mentioned in the table are the Chicago & North Western, the Chicago, St. Paul, Minneapolis & Omaha, the Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago Great Western, the Wisconsin Central, the Minneapolis, St. Paul & Sault Ste. Marie, the Great Northern system, the Northern Pacific, the Union Pacific system and the Illinois Central.

A glance at column 4 shows that the gross earnings of each of these railways during the last five years were substantially greater than during the five years ending with the fiscal year 1905, the greatest increase being that of the Northern Pacific, which amounted to 52 per cent., and the average increase for all of the railways in the list being 25 per cent.

Theoretically, the railway business is a business of increasing returns; that is, each increase in gross earnings should be accompanied by a larger increase in net earnings, because as traffic increases the cost of handling each unit of traffic decreases. How far theory and fact are apart as to the railways in this list will appear from a comparison of the figures in column 4 and column 7. Such a comparison shows that the percentage of increase in net earnings was less than the percentage of increase in gross earnings on every railway in the list except the Wisconsin Central and the Union Pacific system, and that while the average increase in gross earnings for all the roads was 25 per cent. the average increase in net earnings for all the roads was but 17 per cent. Of course, the explanation of the fact that net earnings increased so much less in proportion than gross earnings is to be found in the figures relating to operating expenses. The increase in the cost of maintenance of equipment per mile was particularly great, averaging on all the railways in the list 54 per cent. This increase, of course, was due both to the fact that the unit costs of materials and labor increased and to the fact that the number of cars per mile increased.

It is interesting to note that the ratio of operating expenses to gross earnings increased on every road in the list except the Wisconsin Central. Even the operating ratio of the Union Pacific, which has been the wonder of Wall Street, was but 51.51 in the five years ending 1905 and was 51.63 in the five years ending 1910.

The greater part of the labor cost involved in the operation of a railway appears in the expenses of conducting transportation, and it has been mainly with the aim of reducing this item of expense that grades have been revised, larger equipment put into service, etc. The efforts to reduce the cost of conducting transportation have been nullified by the increased cost of labor. How completely they have been nullified is shown by the fact that the cost of conducting transportation was a greater percentage of total operating expenses during the last five years than during the preceding five years on every road in this list, excepting the Illinois Central, and that for all of the roads the percentage of the cost of conducting transportation to the total operating expenses increased from 33.56 per cent. in the five years ending with 1905 to 36.04 per cent. during the last five years.

RECENT MALLET ARTICULATED LOCOMOTIVES.

St. Louis & San Francisco.—Seven Mallet articulated compound locomotives were recently built for the St. Louis & San Francisco by the American Locomotive Company. They are intended for pusher service and are designed to handle 1,950 tons on a 1½ per cent. grade at a speed of five miles per hour, and 1,600 tons on the same grade at 10 miles per hour. The maximum grade on which they will operate is 2.3 per cent., and on this grade they are expected to haul 1,230 tons at a speed of five miles per hour, or to have a speed of 10 miles per hour on the same grade with 1,000 tons.

The most interesting feature of the design lies in the new arrangement of steam pipes to the high pressure cylinders. These pipes are in two sections, one being located inside of the

GROSS EARNINGS, NET EARNINGS, MAINTENANCE CHARGES AND TRANSPORTATION EXPENSES.

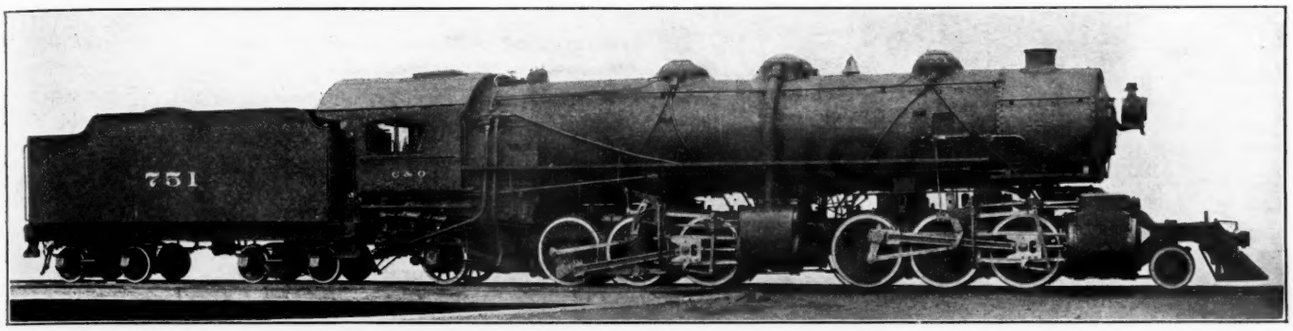
Company.	Gross Earnings per mile.			Net Earnings per mile.			Maintenance of Way and Structures per mile.			Maintenance of Equipment per mile.			Ratio of Operating Expenses to Gross Earnings. Total Operating Expenses.		Cond. Trans. and Traffic Expenses.		Maint. of Way and Structures.		Maint. of Equnpment.	
	5 yrs. ending 1905.	5 yrs. ending 1910.	INCREASE	5 yrs. ending 1905.	5 yrs. ending 1910.	INCREASE	5 yrs. ending 1905.	5 yrs. ending 1910.	INCREASE	5 yrs. ending 1905.	5 yrs. ending 1910.	INCREASE	5 yrs. ending 1905.	5 yrs. ending 1910.	5 yrs. ending 1905	5 yrs. ending 1910.	5 yrs. ending 1905.	5 yrs. ending 1910.	5 yrs. ending 1905.	5 yrs. ending 1910.
	$	$	%	$	$	%	$	$	%	$	$	%	%	%	%	%	%	%	%	%
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
C. & N. W.	7,240	8,858	22	2,617	3,010	15	941	1,133	20	734	1,097	49	63.82	65.89	38.75	38.76	12.91	12.72	10.15	12.34
C., St. P., M. & O.	7,083	7,967	13	2,730	2,814	3	1,059	995	*6	666	892	34	61.46	64.73	34.40	38.82	14.99	12.51	9.42	11.20
C., M. & St. P.	6,782	8,072	19	2,525	2,751	9	1,093	960	*12	612	911	49	62.69	64.68	35.19	38.95	16.23	12.86	9.06	12.10
C., B. & Q.	7,107	8,739	23	2,601	2,626	1	1,093	1,539	41	954	1,549	62	63.39	70.64	31.89	32.45	14.87	17.13	13.34	17.29
C., R. I. & P.	6,485	7,607	17	2,150	2,242	4	982	1,123	14	713	942	32	67.17	70.49	38.27	40.47	15.04	14.86	11.07	12.46
C. G. W. Syst.	6,745	7,524	12	1,692	1,805	7	825	882	7	765	1,063	39	74.93	77.54	46.43	47.58	12.18	11.74	11.42	14.22
Wis. Cent.	6,391	7,639	20	2,078	2,592	25	773	916	18	674	965	14	67.67	66.11	35.89	38.47	12.13	11.55	10.51	13.05
M., St. P. & S. S. M.	4,402	5,581	27	2,027	2,440	20	465	568	22	307	590	92	54.10	56.05	27.45	33.31	10.77	10.26	9.61	10.74
Gt. Nor. Syst.	6,863	8,645	26	3,390	3,516	4	911	1,411	55	552	991	80	50.88	59.37	26.80	29.53	12.93	16.21	8.11	11.74
Nor. Pac.	7,921	12,009	52	3,798	5,168	36	1,233	1,563	27	688	1,295	88	51.90	56.37	24.80	31.03	15.34	12.85	8.56	10.81
U. P. Syst.	8,935	13,059	46	4,234	6,385	51	1,102	1,583	44	1,021	1,450	42	51.51	51.63	25.84	26.31	12.13	12.24	11.05	10.32
Ill. Cent.	10,149	12,306	21	3,380	3,623	7	1,358	1,530	11	1,437	2,302	60	66.58	70.29	36.95	36.78	13.45	12.58	14.04	18.78
Group	7,175	9,000	25	2,769	3,248	17	986	1,184	20	760	1,171	54	61.34	64.48	33.56	36.04	13.58	13.13	10.53	12.92

*Decrease.

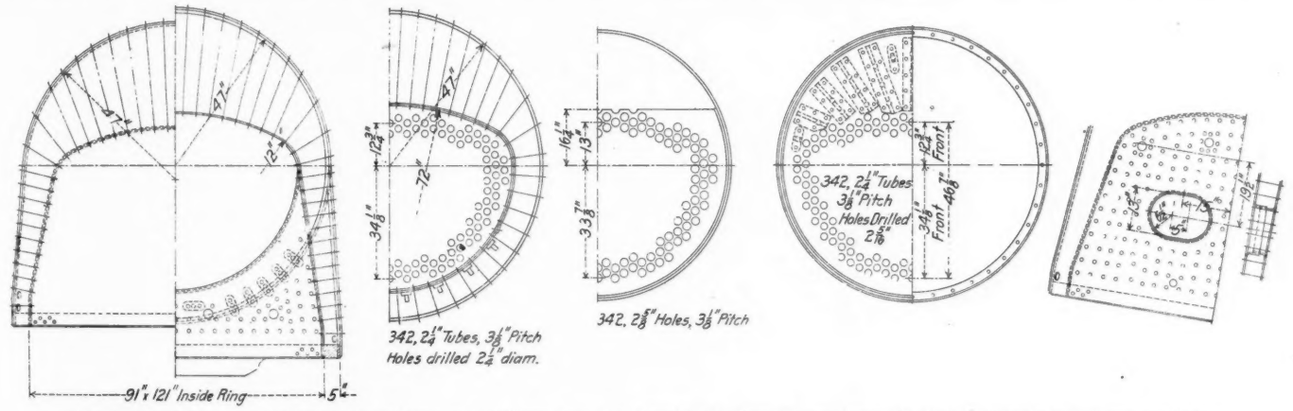
boiler and connecting to a T-head, which in turn is connected to the throttle pipe. The application of this arrangement was possible because of the use of a combustion chamber which allows space for the introduction of the pipes between the tubes and the shell of the boiler. The outside section of the high pressure steam pipe consists of a copper pipe fitted with an elbow at either end and with a ball joint connection with the lower end of the inside pipe and also with the cylinders. The construction is such that the outside section can be removed without in any way disturbing the inside pipe. This arrangement has several important advantages. It simplifies the construction by obviating the necessity for using the special design of cast steel dome employed in previous engines of the Mallet type, where the high pressure steam pipes are on the outside of the boiler. Being located inside of the boiler the steam pipes do not interfere with the engineer's view ahead.

One engine of the order is equipped with the Street locomotive stoker. Following the practice pursued in a number of recent engines of the Mallet type built by the American Locomotive Company, the reach rod to the valve gear of the forward engine is located on the center line of the engine and is connected to a downward extending arm in the center of the main reverse shaft by a universal joint. Data and general dimensions for these locomotives are given on the accompanying table.

Chesapeake & Ohio.—This road recently placed an order for 24 Mallet locomotives of the 2-6-6-2 type with the American Locomotive Company. Last July it received a Mallet compound locomotive of this design from the same builders, which was purchased for trial purposes and upon its successful service the present order was contingent. The engine has been used in regular road service, for which the new lot is also intended.



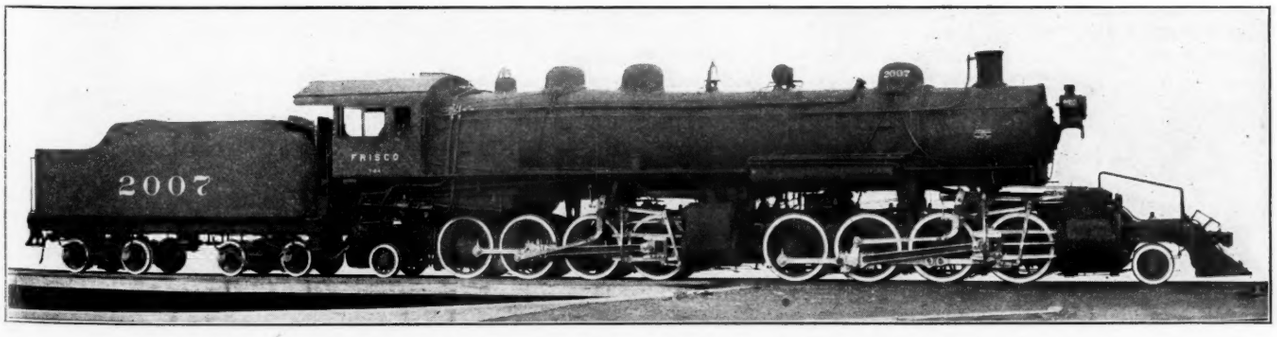
Mallet Articulated Locomotive for the Chesapeake & Ohio.



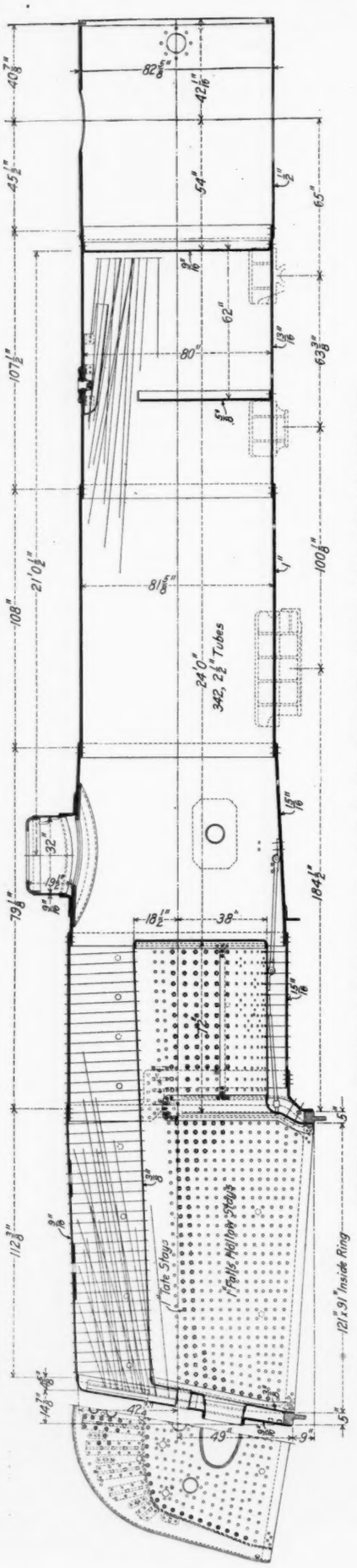
Cross-Sections and End Elevations of Boiler for St. Louis & San Francisco Mallet Articulated Locomotive.

The trial locomotive was put in service on the division between Handley and Allegheny. From the former place to Ronceverte, a distance of 106 miles, is a continuous easy up-grade varying from a minimum of 2¼ ft. to the mile to a maximum of 21 ft., the average grade from Thurmond, 38 miles east of Handley, to Ronceverte, being 19 ft. to the mile. From this last point to Allegheny, the summit of the division, there is a 13 mile grade, 30 ft. to the mile.

Prior to the advent of the Mallet a consolidation locomotive having a total weight of 190,300 lbs., weight on driving wheels of 169,600 lbs., cylinders 22 in. x 28 in., and a theoretical maxi-



Mallet Articulated Locomotive for the St. Louis & San Francisco.



Longitudinal Section of Boiler for St. Louis & San Francisco Mallet Articulated Locomotive.

mum tractive effort of 41,120 lbs., had handled the freight traffic over this division. The rating of this class of locomotive was 1,800 tons from Handley to Ronceverte, from which point a pusher was required to assist in handling this tonnage up the .57 per cent. grade to Allegheny. Passing the summit, the road runs down the other side of the hill into Clifton Forge, 16 miles of this distance being on an incline of 60 ft. to the mile.

In ordering heavier equipment, the purpose was not so much to dispense with the pusher service on the .57 per cent. grade on the western slope of the hill as to increase the maximum train load over the division. A Mikado type locomotive suitable for the track conditions and capable of handling 2,250 tons between Handley and Ronceverte could have been provided, but it would have required the assistance of a helper to handle the tonnage on the grade between the latter point and Allegheny. The Mallet, on the other hand, is capable of handling 3,000 tons over the summit of the division without the aid of a pusher. It was, moreover, thought that because of the economy in fuel consumption due to compounding, the Mallet locomotive could handle its tonnage with less coal than the Mikado type would take to haul the 2,250 tons. The locomotive here illustrated was designed to haul 3,000 tons at a speed of 15 miles per hour on the grade of 21 ft. to the mile, and at 12 miles per hour on the grade of 30 ft. to the mile, combined with a minimum curve of 5 deg. 45 min., not compensated. The traffic from Thurmond to Clifton Forge is steel hopper cars loaded with coal, and returning empty.

In service the locomotive has exceeded its estimated capacity, and has handled alone 3,492 tons eastward over the division. With a load behind the tender of 3,033 tons, made up of 45 steel hopper coal cars, speeds of 20, 22 and 24 miles per hour have been maintained on the grades up the river between Thurmond and Ronceverte. It has made the run over the division, 114 miles, in 5 hrs. 37 min., including the time necessary to turn the engine; the actual running time was 4 hrs. 57 min.

The most interesting feature in the design is in the boiler construction, which incorporates a combustion chamber 6½ ft. long. This design was used in order to increase the length of the boiler to bring the firebox back of the rear driving wheels, thereby making it possible to obtain a good depth of throat sheet, without increasing the length of the boiler tubes to an excessive amount. As a result, the depth of the throat sheet is 18 3/6 in., giving a distance between the top of the grate and the lowest boiler tube of 26¼ in. Ordinarily, where the firebox is carried over the driving wheels the bottom tube is only from 19 to 20 in. above the top of the grate. At the same time the boiler tubes are 24 ft. long, which length is not exceptional. Ample water space of about 9 in. on both the bottom and the sides is allowed between the combustion chamber and the shell, to which the chamber is stayed by radial staybolts.

Another departure from previous practice in Mallet locomotives of this type is the use of the American Locomotive Company's latest type of outside bearing radial trailing truck, similar in design to that successfully applied to a number of its recent Pacific type locomotives. In practically all previous articulated compound locomotives of this type of wheel arrangement, built by this company, both the leading and trailing trucks have been of the radial swinging bolster type with journals inside of the wheels. The type of trailing truck used gives a wider supporting base at the rear of the locomotive, and tends to add to its stability. The leading truck is of the same design as that applied by the builders to other locomotives of the 2-6-6-2 type.

That portion of the weight of the engine which is carried by the frame of the front system is supported by two sliding bearings, both of which are normally under load. In accordance with the builders' usual practice where both sliding bearings support weight, the "trim" bolts connecting the upper rails of the front frame with the lower rails of the rear frame are provided with a spring under the nut at the lower end to relieve any excessive load which would otherwise be on the rear bearings, because of inequalities in the level of the track or similar conditions. Except for the features mentioned, the design in general fol-

lows the builders' standard practice. The general data and dimensions are given in the following table:

	Frisco.	C. & O.
General Data.		
Type	2-8-8-2	2-6-6-2
Fuel	Bit. coal	Bit. coal
Tractive effort	83,300 lb.	82,000 lb.
Weight in working order	418,000 lb.	392,000 lb.
" on drivers	360,000 lb.	324,000 lb.
" of engine and tender in working order	567,800 lb.	555,200 lb.
Wheel base, rigid	15 ft. 6 in.	10 ft.
" " total	56 ft. 8 in.	48 ft. 3 in.
" " engine and tender.	85 ft. 6¼ in.	80 ft.
Ratios.		
Total weight ÷ tractive effort	5.01	4.78
Weight on drivers ÷ tractive effort	4.32	3.96
Tractive effort × diam. drivers ÷ heating surface	919.99	763.00
Total heating surface ÷ grate area	68.45	83.40
Firebox heating surface ÷ total heating surface, per cent	6.11	6.10
Weight on drivers ÷ total heating surface	69.74	54.00
Total weight ÷ total heat'g sur.	80.97	65.30
Vol. equiv., simple cylinders, cu. ft.	23.05	21.80
Total heating surface ÷ vol. equiv. cylinders	223.94	276.00
Grate area ÷ vol. equiv. cyl's.	3.27	3.31
Cylinders.		
Kind	Ast. Comp.	Ast. Comp.
Diameter	24½ and 39 in.	22 and 35 in.
Stroke	30 in.	32 in.
Valves.		
Kind	H. P., Piston L. P., Slide	H. P., Piston L. P., Slide
Diameter	14 in.	12 in.
Travel	6 in.	6 in.
Wheels.		
Driving, diameter over tire	57 in.	56 in.
" thickness of tire	3½ in	3 in.
" journals, main, diam.	10 x 12 in.	9½ x 13 in.
" " others, diam.	9 x 12 in.	9 x 13 in.
Engine truck, diameter	30 in.	30 in.
" " journals	6½ x 12 in.	5½ x 10 in.
Trailing truck, diameter	30 in.	44 in.
" " journals	6½ x 12 in.	7½ x 14 in.
Boiler.		
Style	Conical	Conical
Working pressure	200 lb.	225 lb.
Outside diameter of first ring	81⅝ in.	83⅞ in.
Firebox, width and length	90¼ x 120⅛ in.	96⅛ x 108⅛ in.
" plates, thickness	C., ⅜; T., ½; S. and B., ⅜ in.	C., 7/16; T., 9/16; S., 7/16; B., ⅜ in.
" water space	5 in.	F., 5; S. and B., 4½ in.
Tubes, number and diameter	342—2¼ in.	401—2¼ in.
" length	24 ft.	24 ft.
Heating surface, tubes	4,817.1 sq. ft.	5,646 sq. ft.
" " firebox	315.7 sq. ft.	344 sq. ft.
" " arch tubes	29.0 sq. ft.	23 sq. ft.
" " total	5,161.8 sq. ft.	6,013 sq. ft.
Grate area	75.4 sq. ft.	72.2 sq. ft.
Center boiler above rail	10 ft.	10 ft.
Top smokestack above rail	15 ft. 9 5/16 in.	14 ft. 11 7/16 in.
Tender.		
Frame	13 in. channel	13 in. channel
Wheels, diameter	33 in.	33 in.
Journals	5½ x 10 in.	5½ x 10 in.
Water capacity	8,000 gal.	9,000 gal.
Coal capacity	10 tons	15 tons.

REINFORCED CONCRETE WORK ON THE NORTHERN PACIFIC.

During the past two years many of the smaller pile and timber trestles on the Northern Pacific lines in Montana have been replaced by structures consisting of reinforced concrete slabs on thin reinforced concrete piers supported on concrete piles. One of these structures is shown in Fig. 1. They are similar in many respects to the reinforced concrete trestles which have been in successful use for some years on other large systems, and which present many advantages for openings where the maximum height does not exceed 20 ft., and where the streams are free from drift and ice. Some of the principal advantages are: (1) A large cross sectional area may be left to care for the maximum flood waters at a minimum first cost. (2) The ballasted deck permits lining and surfacing by the section crews when necessary, and makes track which rides as well as an embankment. (3) The maintenance charges are a minimum, as no cleaning, painting or adjusting is required.

In constructing these trestles, the slabs and piles are cast at a central plant, and when cured, shipped to the bridge sites, the rest of the work being done by the regular division forces. The piles are driven by a steel track driver equipped with a 4,500-lb. drop hammer, and a water jet. The head of the pile is protected during driving by a steel cap, fitted with a cushion and wooden follower. The best progress in driving is made by short quick blows with the heavy hammer in conjunction with the use of the jet. The piles stand a great deal of pounding, and can be driven in formations in which a wooden pile would be shattered.

The piles are driven to refusal, and then capped with a concrete bent, 2 ft. 6 in. thick and 15 ft. long, the piles being allowed to project into the bent a varying amount, provided their tops do not come nearer than 1 ft. from the bottom of the slab nor less than 3 ft. from the bottom of the bent. This allowable variation avoids the necessity of cutting the piles and, as they are made an integral part of the bent by a system of stirrups at their tops, it makes a very strong and rigid construction.

The bents present the usual smooth pier face to the current of the stream, and lessen the danger of choking the opening with small drift. The bents are spaced 16 ft. center to center.

Each slab span is cast in halves, the dimensions of each half being 7 ft. x 2 ft. x 16 ft. The usual parapet is provided for holding ballast. Slabs are placed by a wrecking crane, as illustrated in Fig. 2. The joints at the ends are filled with an asphalt mastic, and a zinc bearing plate placed on a grout cushion on

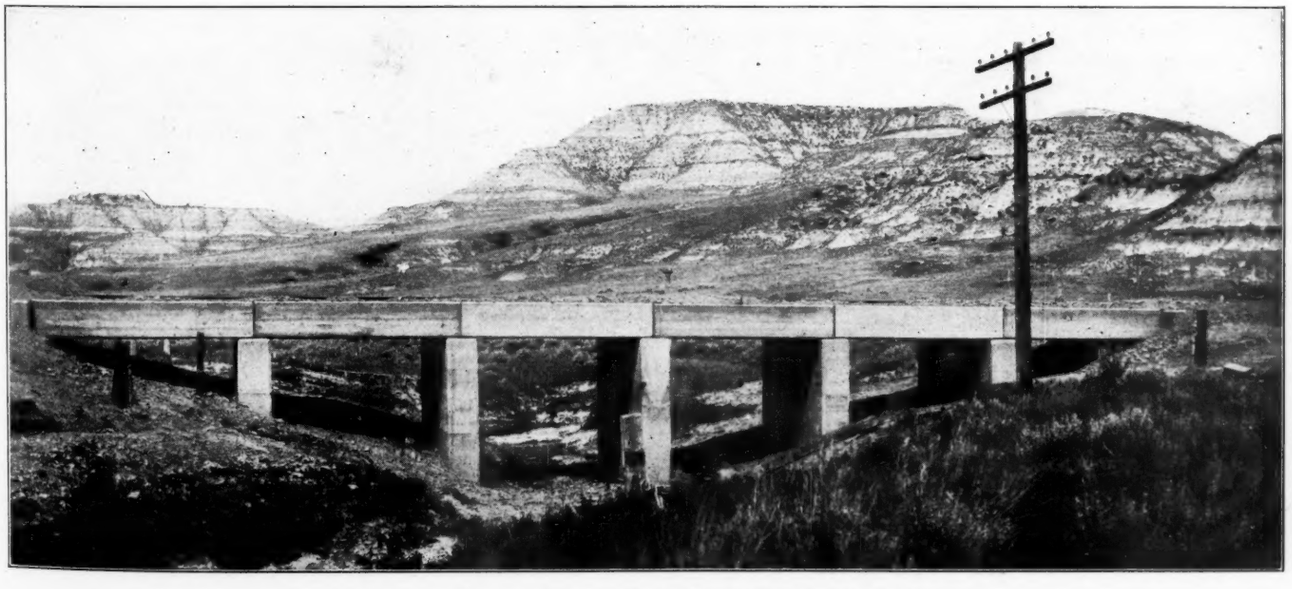


Fig. 1.—Reinforced Concrete Bridge; Northern Pacific.

top of the bent allows for movement due to expansion. Either fine crushed rock or clean gravel is used for ballast.

The concrete plant for manufacturing piles, slabs and also reinforced concrete pipe is at Glendive, Mont. The general arrangement is shown in Figs. 3, 4 and 5.

The sand and gravel are loaded into ballast dump cars by a steam shovel at the pit; the cars are hauled to the plant, pushed up on the elevated storage trestle and dumped. The storage capacity of the trestle is approximately 50 cars. From the dump the gravel is automatically fed on to a 16-in. rubber belt conveyor, which carries it to the top of the mixing tower, where it is discharged down a series of inclined screens which remove stones too large for concrete, and separate the stone from the sand, depositing them in separate bins, the excess sand and stone being discharged by a separate chute into a waste car alongside the tower.

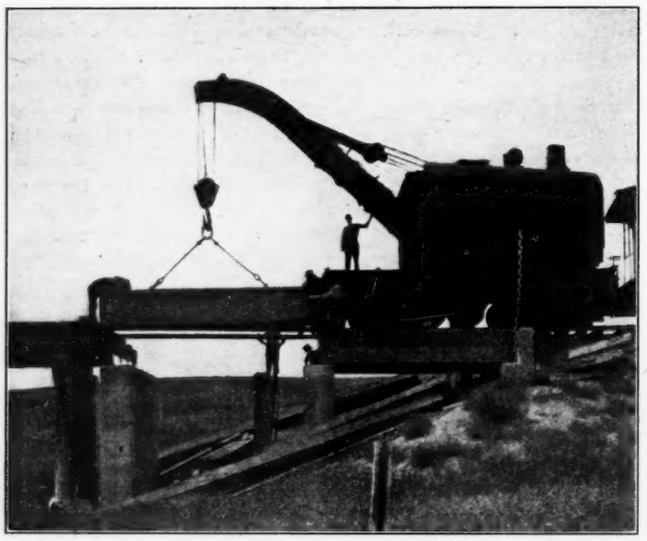


Fig. 2.—Wrecking Crane Placing a Reinforced Concrete Bridge Slab.

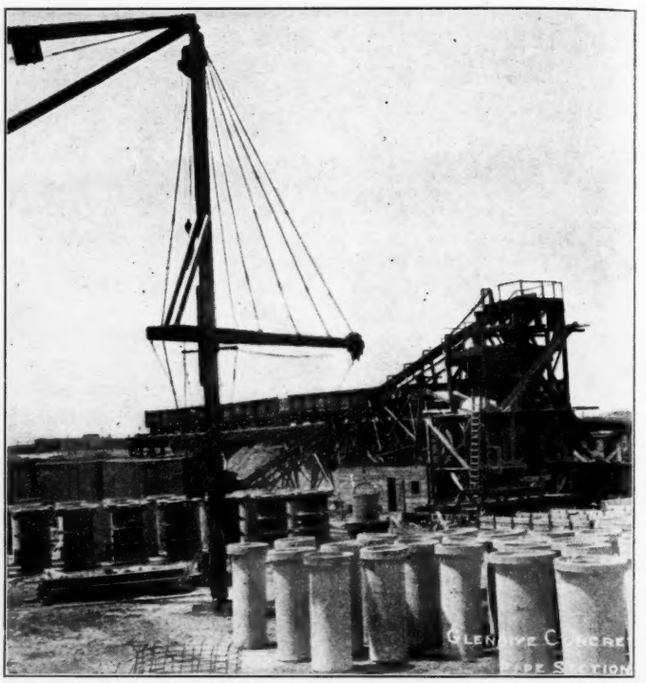


Fig. 4.—Side View of Concrete Plant.

Below the storage bins are the charging hoppers, arranged so that sand and stone can be measured and cement added. From

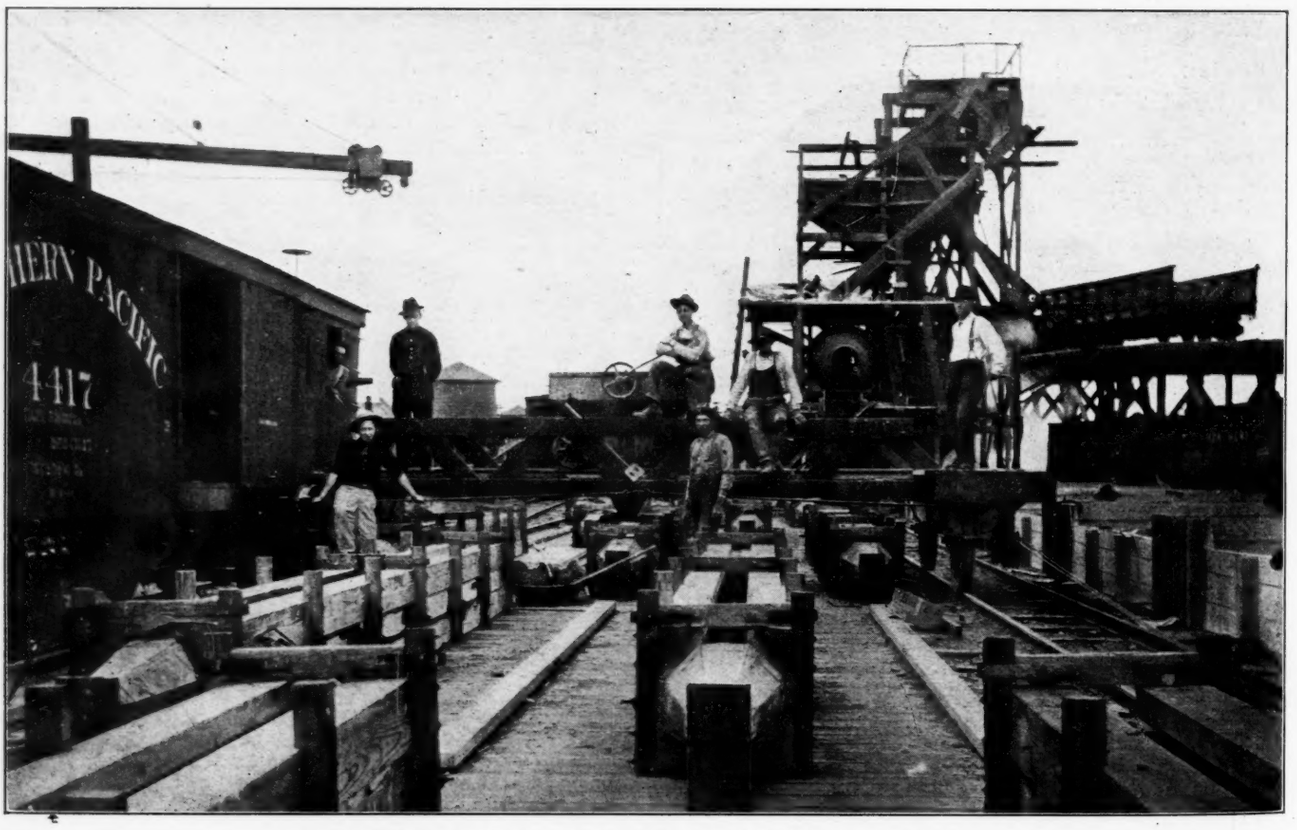


Fig. 3.—Front View of Concrete Plant, Northern Pacific.

the charging hoppers the aggregate is fed into a mixer of 1 cu. yd. capacity, water being supplied by a main from the railway company's water tank.

Concrete is dumped from the mixer into a bottom dump concrete car, which in turn runs on a gantry car. This gantry car spans either the slab or pile platform, and runs the full negth of them, the gantry being operated by a cable and grip, at a speed of about eight miles an hour.

The two form platforms are parallel, 18 ft. wide, 400 ft. long and spaced 8 ft. apart, the mixing tower being located centrally at the end. This arrangement permits depositing concrete very quickly at any point on either platform, the dump of the car being arranged so that flow of concrete can be controlled at all times.

On the outside of the platforms are standard gage tracks for loading and handling all manufactured products. As soon as piles and slabs are set up sufficiently to permit handling, they are removed from the platforms and stored on a sand bed outside these tracks.

The slab form is simply a square box with light partition dividing the slab into halves, the sides of the box being braced to the platform. Piles are octagonal in shape, 16 in. in least diameter and 16 ft. to 30 ft. long. The pile form is made in two sections, which set over a bottom strip permanently fastened to the platform. A stopper is used in the forms for varying the length of pile.

All reinforcement is of deformed bars, shipped in as straight rods, and bent in special machines to the shape required. The pile reinforcement is assembled complete before being placed in the forms, and is held in proper position by a positive arrangement in the reinforcement itself. The reinforcement for the slabs is supported the proper distance from the bottom by small beveled concrete blocks, all reinforcement being wired together to insure retaining its position during the depositing of concrete.

The pipe section of the plant is located at right angles to the platform, and at the end next to the mixing tower. This section is covered with a crane derrick, having a 60-ft. boom. Pipe forms are set up on the arc of a circle to simplify the movements of the derrick. Concrete is conveyed to the forms in a special bucket, having an adjustable dump. The bucket is picked up by the derrick and swung over the forms, the positive control of the dump enabling the operator to deposit the concrete as needed. All reinforcement for pipe forms is rolled and wired on mandrels to insure proper size and shape, the frame being complete before it is placed in the form.

The plant is now closed for the winter, but it is expected that operations will be started again early in the spring, as in manufacturing concrete products of this kind it is of very great advantage to keep the supply well ahead of the demand in order to give them proper time for seasoning.

For the foregoing we are indebted to H. E. Stevens, bridge engineer, St. Paul, Minn.

Fig. 5.—Rear View of Concrete Plant, Northern Pacific.

PROPOSED LEGISLATION REGARDING CAR CLEARANCE.

Estimates made by 109 operating railway companies indicate that to comply with the bill introduced in congress by Representative Martin of Colorado on June 1, 1910 (H. R. 26459) regulating the clearance of cars and locomotives would cost these companies $444,000,000. The proposed legislation becomes of special interest at this time because of references recently made to it by President Taft. In a speech on October 1 in New York the President said: "There is badly needed legislation for additional safety appliances," and added that he referred among other things to the elimination by government direction of danger to railway employees from overhead and side-way projections. The bill introduced by Mr. Martin provides as follows:

Maximum width of all locomotives in service to be 10 ft. 6 in. over all, after January 1, 1912.

Maximum width of all cars to be 10 ft. 6 in.; maximum height of all cars to be 14 ft. 2 in. to top of running board, after January 1, 1912.

No structure of any kind, including tunnels, rock cuts, etc., to be closer to any track than 6 ft. 11 in. from center to nearest track.

Exception: Platforms not exceeding 3 ft. 11 in. in height from top of rail. Overhead clearances to be 20 ft. from top of rail in all cases, effective January 1, 1912. Report to be made to the Interstate Commerce Commission by January 1, 1911, showing all existing structures which do not conform to these clearances.

The Interstate Commerce Commission may, upon investigation, exempt from these provisions any tunnel, retaining wall, embankment or permanent overhead structure, if removal is impracticable.

Track centers must be 12 ft. 6 in. apart in all cases.

Space between yard tracks must be kept clear of obstruction.

Penalty, $500 for each day a car, engine or structure is used in violation.

President Taft evidently had got additional information on the subject before he wrote his annual message, for in his message he said:

"The entire removal of outside clearances would be attended by such enormous expense that some other remedy must be adopted. By the act

of May 6, 1910, the Interstate Commerce Commission is authorized and directed to investigate accidents, to report their causes and its recommendations. I suggest that the commission be requested to make a special report as to injuries from outside clearances and the best method of reducing them."

Of the amount that the 109 operating companies estimated they would have to spend to comply with the terms of the Martin bill, $7,500,000 would be for bringing the equipment within the limits, and the rest, or $436,500,000, to remove or enlarge structures, tunnels, etc. Of course, the estimate given is only approximate, as a number of railways have failed to give an estimate on certain of the items on the ground that the cost of complying with the provisions in which these items appear would be so enormous that it would be practically impossible to conform with them.

A movement has been started to have each railway investigate on its own line the situation with regard to the location of mail cranes, standpipes and cattle chutes, to see whether they actually are placed at the distance from the center of the nearest track prescribed by the standard on each road. The roads will also make an investigation of the accidents that occurred in the year ended June 30, 1910, for the purpose of ascertaining the following points:

1. The actual clearance from the center of the nearest track at the point of accident.
2. The dimensions of the car or locomotive involved in the accident.
3. Whether the clearance required in the proposed legislation would have prevented the accident.

DOUBLE TRACK RAILWAYS IN IOWA.

The railway map of Iowa, given herewith, shows, by the heavy lines, all sections of railway in the state on which there are two main tracks. The termini of the sections are as follows:

IOWA.

Atchison, Topeka & Santa Fe.

	No. Miles.
Ft. Madison-Dumas, Mo.	20
Chicago, Burlington & Quincy.	
Burlington-Red Oak	237
Balfour-Pacific Jct.	8
Chicago Great Western.	
Oelwein-Stanley	7
Fair Grounds, Ia.-Rice, Ill.	20
At Des Moines	3
Chicago & North Western.	
Clinton-Council Bluffs	347
Chicago, Rock Island & Pacific.	
Davenport-Iowa City	54
Davenport-Muscatine	28
Illinois Central.	
At Dubuque	1
At Cherokee	1
At Council Bluffs	2
Union Pacific.	
Council Bluffs-Omaha, Neb.	3

FIVE YEARS' DEVELOPMENT OF GERMAN RAILWAYS.

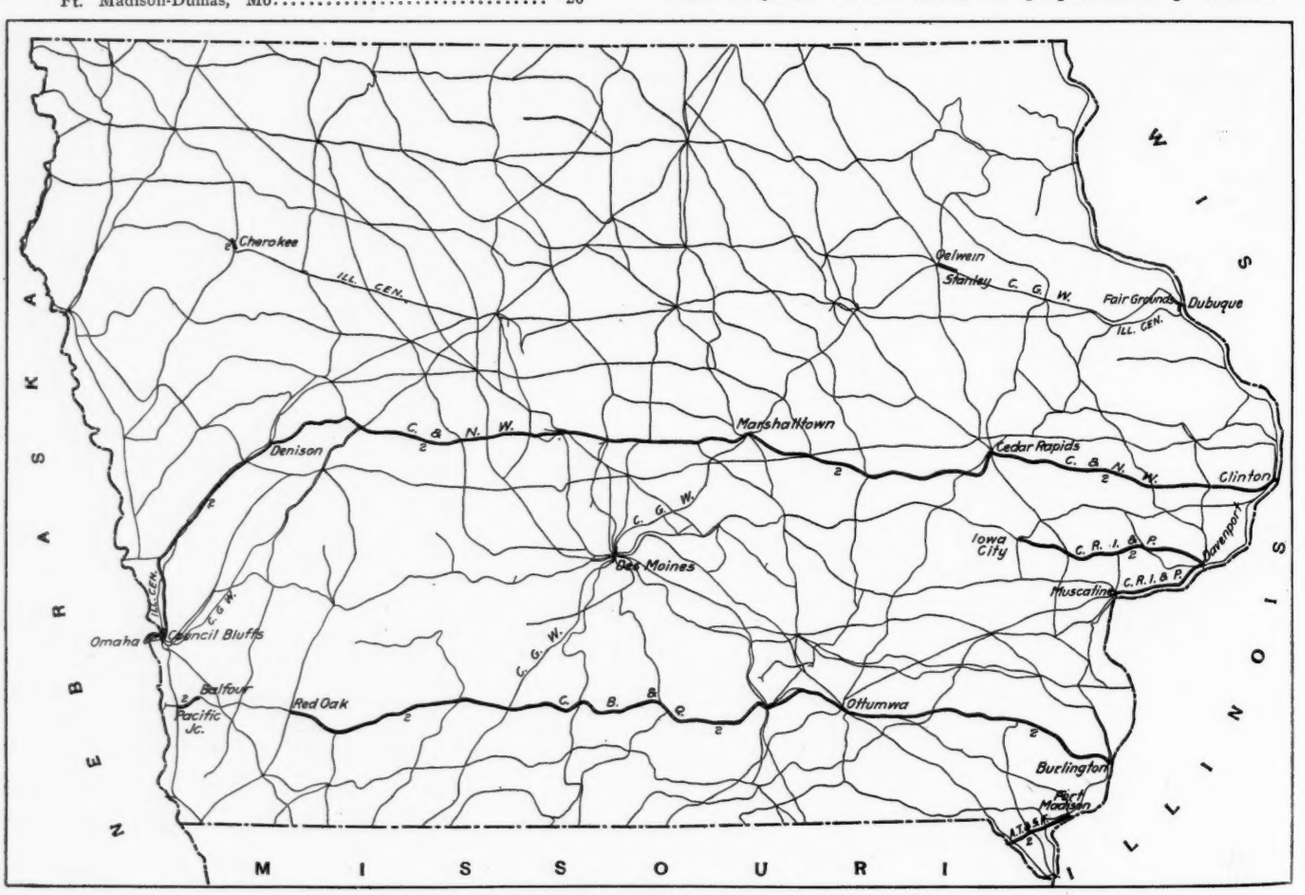
BY DR. W. PETERS.

Ministry of Public Works, Berlin.

I.

ORGANIZATION.

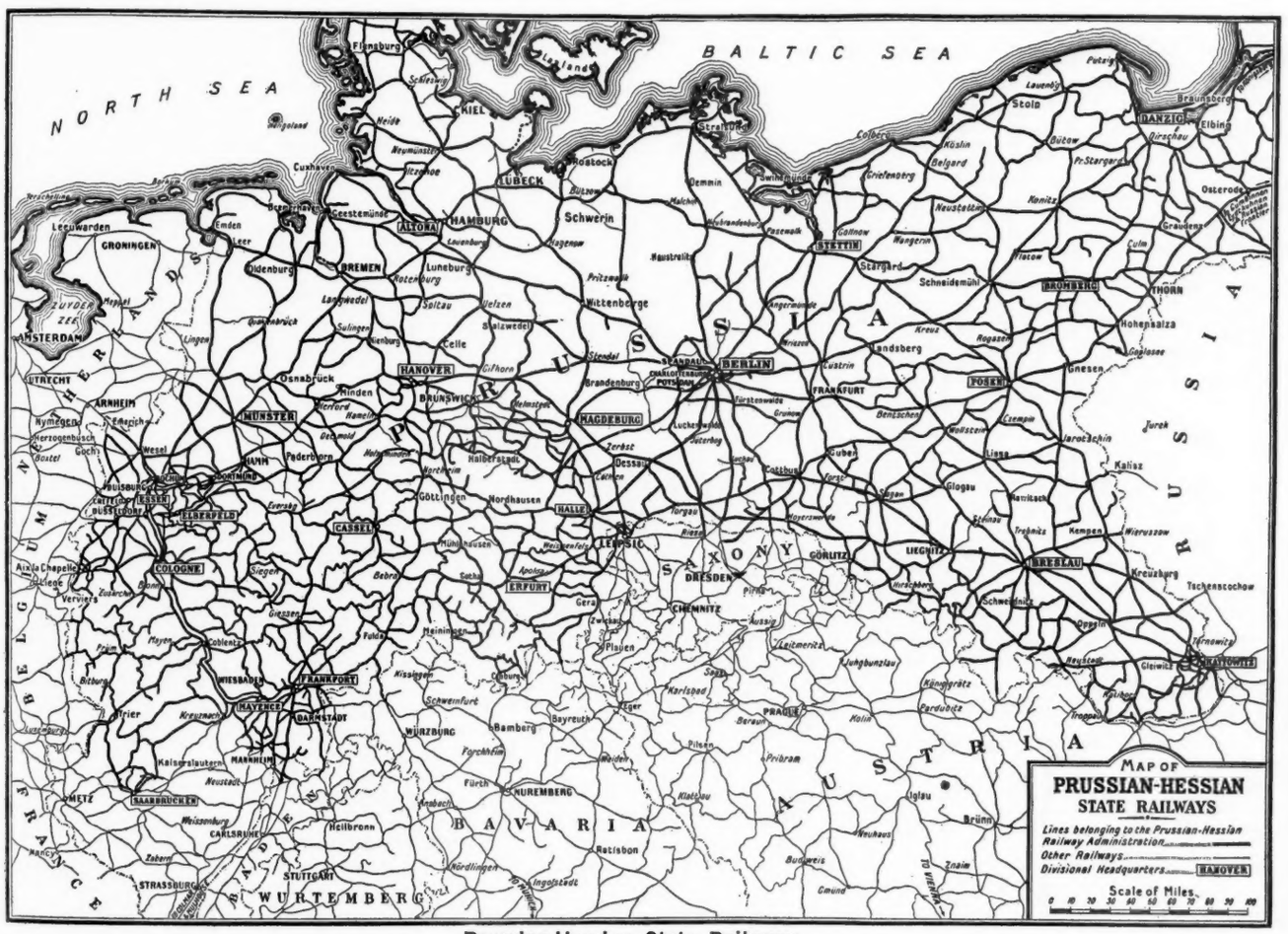
By far the greater part of the German railways are state railways, that is to say, the larger German federal states own and work their lines. First in order of importance come the Prussian state railways, which represent almost two-thirds of all the standard gage lines of Germany. The Prussian lines are followed, at a great distance, by the Bavarian, Saxon and Wurtemberg lines, then by the lines in Alsace-Lorraine, which are owned and worked by the German Empire, and finally by the Baden, Mecklenburg and Oldenburg state railways. As the acquisition on the part of the state of most of the large railways in Germany has been completed for some time, there was but relatively little left to do in this direction during the space of the last five years. Nevertheless, the proportion of private lines



Double Track Railways in Iowa.

composing the standard gage railways of Germany, which at the beginning of 1905 only amounted to 7.7 per cent., has now sunk to 6 per cent. This diminution is due for by far the greater part, to the purchase, at the beginning of the year 1909, on the part of Bavaria by the Palatinate Railways (506 miles) in that part of Bavaria situated on the left bank of the Rhine. The most important private railways now left are the Lübeck-Büchen Railway, a trunk line in the district of the free Hanseatic town of Lübeck and in the Southern part of the Prussian province of Schleswig-Holstein, about 86 miles long, and the Westphalian Provincial Railway, a secondary line about 166 miles long, in the Prussian province of Westphalia. The tendency which is becoming even more pronounced throughout the whole of Germany is to leave in private hands only such railways as by reason of their merely local character are of no importance so far as the national welfare is concerned. In the case of narrow gage railways purely local interest plays by far the greater part, and to this fact is due the slight increase in the proportion of private lines (from 55.5 per cent. to 56 per cent.) of this kind. This point of view is likewise of deciding influence as regards the question as to whether the construction and operation of high-speed electric lines between neighboring towns can be left to private enterprise. There will, however, be no scruples against the adoption of this course, when such lines, as regards both construction and operation because, let us say, they are to be worked in connection with the tramway system of one or both places—are intended to serve, primarily, the purposes of traffic between such neighboring towns. As an example of this may be cited the projected interurban line from Cologne to Düsseldorf, which it is intended to leave in private hands.

Systematic alterations in the administrative organization of the more important German railway managements have only been carried out in isolated cases during the last five years. In Prussia the new arrangements of the state railway adminstration effected in the year 1895, whereby the administration and working of the sections placed under their direct control was entrusted to the railway managements—the service offices being done away with—has continued to work satisfactorily. The need of a central authority for a number of services, which were previously under the charge of the various administrative departments, led to creation, on April 1, 1907, of the *Eisenbahn-Zentralamt* (Central Railway Bureau) in Berlin, which is on a coordinate footing with the railway managements. On this bureau devolve, amongst other duties, the provision of the permanent way, safety appliances, and locomotives, cars and important material, as well as the preparation of central administrative and service orders and construction schemes. On it devolves likewise the entire daily disposal of the freight rolling stock, a duty the importance of which has been further heightened since the creation of the German *Staatsbahnwagenverband* (state railway car union) on April 1, 1909. The supervision of 21 railway divisional managements and the railway central office devolves on the department of the minister of public works.



Prussian-Hessian State Railways.

Contemporaneously with this change in Prussia a new arrangement has been carried out on the Bavarian state railways, and that in the direction of a decentralization of the services. The former central general management, which had charge of the services, subject to the supervision of the government, was done away with on April 1, 1907. Its duties have, for the greater part, been transferred to five newly created railway managements, while another part has been entrusted to the department of the minister of ways and communications, to which several offices were directly affiliated with a view to the management of a number of services. The organization of the administration shows

thus a certain similarity to the Prussian system. A movement is likewise on foot for a new arrangement of the administration on the Saxon state railways, which will in all probability take a somewhat similar course.

DEVELOPMENT OF THE RAILWAY SYSTEM.

The extension of the railway system has in no wise suffered from the effects of the fluctuations in the economic development as evidenced during the last few years. At the end of 1904 the standard gage lines represented a total length of 32,000 miles and at the end of 1908*, 35,700 miles. According to the latest account as issued by the imperial railway office the increase in the financial year 1909 (until March 31, 1910) amounted to 580 miles, so that the total length would work out at 36,280 miles. This signifies an increase of 6.1 per cent. up to the end of 1908, and of 7.9 per cent. up to the end of 1909. The increase corresponding to five years attains almost the length of the Saxon and Baden state railways taken together. (At the end of 1908: Saxony 1,750 miles, Baden 1,050 miles.) These figures assume special significance from the fact that the railway extension outpaced even the considerable increase in the population of Germany (from 59½ to 63 million inhabitants in 1908), although the difference is not very great. At the end of 1904 there were 5.63 miles to every 10,000 inhabitants, while at the end of 1908, the number was 5.64 miles. The increase in the length of railway in proportion to the area is naturally much more significant. The length of standard gage track per 100 square miles was, at the end of 1904, 16 miles, and at the end of 1908, 17 miles. Very significant is the fact that of the new standard gage lines more than three-quarters are secondary lines, a proof of the solicitude, engendered by the principle of state ownership, for the opening up of new regions by small railways which yield for the greater part but low profits. The narrow gage lines show a corresponding increase; their length has increased to 1,300 miles since 1905, *i.e.*, by 6.1 per cent. in four years. On the other hand, those light secondary railways which are exclusively given over to local passenger and good traffic, and to the service of those districts, in which the traffic demands are not extensive enough to justify the construction of main lines, show a much greater increase in length. At the end of 1904 they represented a total length of 5,200 miles, a figure which by the end of 1908 had risen to 6,000 miles, being an increase of 14.4 per cent. This is, comparatively speaking, more than double that of the other lines. The increasing importance of such light railways which, taken as a whole, represent a thoroughly healthy financial development, can only be welcomed. They constitute, as feeders of the trunk lines, a most welcome complement, which is all the more necessary in that the further extension of the trunk line system presupposes the existence of a more pressing need for traffic than is required for the construction of a light railway. When it is remembered that Germany possesses, alongside of Belgium, Great Britain and Switzerland, the densest network of railways, considered from the point of view of extent, and that, excepting a few countries with a much smaller population† in proportion to the density of the population, it possesses, in common with Belgium and Switzerland, the most developed system, it will be easily understood that large new trade routes, in so far as they do not serve to ease lines already in existence, will but seldom be constructed; that the opening up of new regions by means of main lines is not a proceeding to be entered on at random; and that frequently precedence is cheerfully yielded to light railways, which can be worked with a far smaller outlay of capital when necessary with the financial aid of the state. As a further complement to the trunk-line system, motor car lines, partly state-operated, have succeeded in gaining a footing in certain districts of Germany. The smaller working capital required pointed to their being employed instead of light railways, especially in the mountainous part of Bavaria as well as on the wide, sparsely peopled plains of Mecklenburg. In Mecklenburg, however, their adoption has been attended with somewhat doubtful success. There are as yet no statistics respecting these lines, so that it is difficult to form any estimate as to their importance as viewed from the point of view of general traffic. If, now, standard gage lines, narrow gage lines and secondary light railways be taken collectively, and the increase of the last two types for the financial year 1909 be taken as equal to the average of the years 1905-08, it will be found that the railway network shows, at the beginning of the year 1910, a total length of 43,700 miles, in round numbers, as against the 4,000 miles of the beginning of 1905. According to this computation there would be, at the present moment, about 21 to 22 miles of railway to every 100 sq. miles (area of Germany 208,000 sq. miles). If now, on the basis of a provisional estimate in accordance with the previous rate of increase in population, the number of inhabitants in Germany be taken at about 64,400,000 at the beginning of 1910, this would mean from 6.7 to 6.8 miles of railway to every 10,000 inhabitants.

The additions to main line mileage represent, however, but a part of the completion of the network. The development of the length of the track must complete the picture. The increase of main tracks amounts to 3,800 miles on standard gage lines (1904, 46,000 miles; 1908, 49,800 miles). Only slightly more than a tenth part, namely 350 miles, corresponds to single-track lines. The greater part of a track length of 3,200 miles is for double-track lines, while the remainder is divided between 30 miles for three-track lines, and 170 miles on four-track sections. Most striking in this connection is the increasing importance of the double-track lines, the length of which has increased by 1,500 miles. More than one track represented at the end of 1904 35.4 per cent. of the German standard gage lines, while at the end of 1908 the percentage had risen to 38.

The strengthening of the permanent way has at the same time made rapid strides. At the end of 1904, 81 per cent. of the main tracks of the standard gage lines still had rails of a weight of 80 lbs. and less to the yard, whereas, by the end of 1908, the percentage had fallen to 65. Rails of a weight of 80-90 lbs. increased from 18 to 30 per cent., and heavier ones from 1 to 5 per cent. The increasing stress to which the tracks are exposed, owing to the increase of the trains, the greater weight of the rolling stock and the higher speeds prevailing, is the cause of this. These circumstances have not, however, led to any material alteration of the numerical proportion between wooden and metal ties. Wooden ties are still more used in Germany, and have also given satisfaction as regards durability. The proportion of metal ties rose only from about 27 per cent. at the end of 1904 to 28 by the end of 1908.

Special attention has been paid to the structural installations ensuring the safety of the service. Signaling appliances, arrangement of stations to ensure a comprehensive view of the whole track layout, avoidance of steep grades and sharp curves, elimination of level crossings, etc., have had the greatest attention everywhere. A few figures will suffice to show this. Grade crossings on the open line decreased from 59 at the end of 1904 to 39 at the end of 1908. Over-line and under-line bridges increased from 17,478 to 19,883, *i.e.*, almost 14 per cent., while the main line mileage only increased by about 6 per cent.. as noted above. Highway crossings on a level with the rails show a corresponding decrease: in 1904 there was a level crossing to every 660 yards, while in 1908 there was only one to every 680 yards, undoubtedly a great success in a country so thickly populated and rich in roads and so intersected with railways as Germany. The number of signal post signals, including advance signals, have increased from about 65,000 to more than 79,000 (21 per cent.) while that of the locking-frames for switches and signals has risen from 12,900 to about 15,500 (20 per cent.). Special

*The definite statistical results for the German railways for the year 1909 are not yet available. The data, including also the following, are taken from the *Statistik der Eisenbahnen Deutschlands* prepared by the imperial railway office.

†In these, as in the United States of America, Canada, Mexico, Siberia, British South Africa, Sweden, Norway, as well as also in Denmark and France, the length of the lines is, in proportion to the population, exceedingly great. Cf. *Archiv für Eisenbahnwesen*, 1910, p. 55 *et seq.*, under *Die Eisenbahnen der Erde*, 1904-1908.

attention has been devoted to the extension of electric section-blocking on single-track lines. The length of the lines thus equipped has increased from 7,500 to 10,400 (35.5 per cent.). At the end of 1908, therefore, 29.1 per cent. (at the end of 1904 23 per cent.) of all the trunk lines, and even 69 per cent. of the double and multiple track lines were equipped with this installation. In the case of the Prussian-Hessian state railways still later figures are available. Almost 92 per cent. of their double and multiple track lines are now equipped with alternating current blocking appliances, and the remainder will be similarly equipped in the course of about a year. This system will likewise be carried out in the course of a few years on the more important single track lines, of which 950 are already worked by section-blocking.

The success of all these new installations has been that not only has a complete balance been established as against the increase of the possibilities of accident, which, as a consequence of the ever increasing masses of passengers and merchandise as well as the more crowded train schedule and higher speeds obtaining, is unavoidable, but the safety of the service has moreover been increased to no inconsiderable extent. Even in the year 1904, to each million train miles there were in Germany only 3.33 (on the Prussian state railways only 5) cases of accidents causing death and injury, and this figure comprises every kind of service accident, such as collisions, derailment, running down vehicles and boiler explosions, as well as every class of persons, such as passengers, railway employees, and outsiders, no matter whether the accident was caused by their own fault or not. For 1908, this figure shows a diminution to 5.06 (on the Prussian state railways 4.69).

Of the more important new lines we will mention here, in the East, the new branch linking up the Russian railway system at Skalmierzyce-Kalisch, in the South, the Donauwörth-Treuchtlingen line (1906), of great importance as connecting Augsburg with central and northern Germany, and the Mühldorf-Freilassing line in Bavaria (1908), which provides access to the South, and especially to Triest, and in the west the Pfalzfeld-Boppard line in the Rhineland and the roundabout line near Hanover (1909). Special mention must also be made of the Sassnitz-Trelleborg ferry line inaugurated in the year 1909, which is served by ferryboats of hitherto unequalled size and capacity and establishes communication between Germany, Sweden and the other northern countries.

Of the larger new station buildings carried out, only the most important will be mentioned: Hamburg, Nuremberg, Wiesbaden (1906), Metz, Lübeck (1908), Mülheim (Rhine) (1909), the switching stations in Mannheim, Vohwinkel (1907), Kalk-Nord near Cologne, and Wustermark near Berlin (1909). The stations in course of re-construction are those of Leipzig, Chemnitz, Dortmund, Stuttgart, Carlsruhe, Elberfeld and Hanover. Mention must likewise be made of the great railway bridge constructions over the Rhine near Cologne and over the Vistula near Marienwerder.

The first plan for traversing the Vosges and opening up a fresh line of communication between France and Germany were formulated at this time. They attracted widespread attention, less owing to the practical importance of such a line of communication from the traffic point of view, which in the main could only be of a local character, than because of the political hopes and military apprehensions associated with the idea.

Electric traction was, at the beginning of the period here under discussion, generally speaking, confined to passenger traffic, moderate train weights and speeds and limited sections of line in particular metropolitan, suburban and municipal lines, as the system was still under the domination of the low voltage continuous current. For long distance railways and freight traffic it was, under these conditions of operation, too expensive. Its field of application was, it is true, to a certain extent widened by the introduction of the three-phase current. It is only in the course of the last few years that, under the instigation and with the constant co-operation of the Prussian-Hessian state railways, a new system of electric traction has been developed, which satisfies in the most comprehensive manner the requirements of railway service. The current here employed is the single-phase alternating current, whereby it is possible to transmit the electric energy at a very high voltage and consequently in almost unlimited quantity, to a great distance, and to supply it to the rail motor vehicles by means of a single overhead line. The adoption of this system makes it possible to turn to account the advantages which electric traction offers, both from the economical and service point of view.

Preliminary work has already been carried out in Germany for several years, with a view to the introduction of electric traction (in Prussia, the Berlin-Grosslichterfelde and the Niederschöneweide-Johannistal-Spindlersfeld suburban lines). The preliminary work of the Prussian state railways may be looked on as completed, now that a large enterprise, the Blankenese-Ohlsdorf Metropolitan and Suburban Line, has demonstrated the serviceableness of the single-phase alternating current.

Although, from what has been said above, there is no obstacle of either a technical or economical nature to stand in the way of the immediate adoption on a large scale of electricity, considerations of national defence counsel forebearance in this respect. It will only be after long experience that a clear idea can be formed as to how far this new system answers military requirements. Until then it will have to be confined to sections which are not of decisive importance for the purposes of national defence, though even here it must always be possible to fall back on steam locomotives for military purposes. The section selected for the first trial of an electric traction plant on a large scale, in Prussia, was the Magdeburg-Bitterfeld-Leipzig-Halle line.

The first section from Dessau to Bitterfeld will, in all probability, be opened to traffic before the end of this year. The principal difficulty in the way of an economical production of electric current has been solved by the construction of a power station in the immediate vicinity of favorably situated and productive coalfields. This installation is intended to form the point of departure for further efforts in this direction. The next plan is the electrification of the Koenigszelt-Hirschberg-Lauban line near the Riesengebirgein, in the Prusisan province of Silesia; the preliminary work for this line is now finished. In Bavaria and Baden the possibility is afforded of utilizing, in a profitable manner, the water power of the country for the production of electricity. The electrification of large sections will, apparently, make rapid progress there also. Preparations are in full swing both in Bavaria, on the Salzburg-Reichenhall-Berchtesgaden Line, in particular, and in Baden on the Wiesental Line.

ROLLING STOCK.

If it be desired to express in a couple of words the success which has attended the exertions of the leading German railway managements in the matter of rolling stock equipment in the course of the last five years, it will suffice to say that the former scarcity, repeatedly in evidence, has given place to a compromise between the necessities of traffic and the number and capacity of the means of exploitation. New acquisitions of rolling stock contributed at the same time, to a certain extent, by holding open for the industries concerned a remunerative field of activity, even during the years of prevailing decline, 1907 and 1908, to a slackening of the retrograde movement. The exertions of the railway administrations not to slacken down in the acquisition of fresh material during bad times were inspired also by the knowledge that a systematic increase of the means of transport, uninfluenced by the fluctuations of the economic situation, pays in the long run, and that the example of faith in the future, thus shown, has a quickening effect on other industries.

The outlay incurred in the acquisition of rolling stock amounted for the period comprised between the end of 1904 and the end of 1908 to more than $230,000,000. Of this sum, $79,000,000 and $78,000,000 were spent in these retrograde years of 1907 and 1908, respectively; that is to say, as much was spent in each of these years as in 1905 and 1906 together. The value of the whole of

the rolling stock in use increased, during these four years, by about one-third, as against an increase in the number of vehicles —losses taken into account—of a little over one-fifth (from 501,581 to 615,219). The considerable excess of the value as compared with the numerical amount is mainly to be attributed to the fact that locomotives and cars have become larger and heavier. The average dead weight of the locomotives employed has increased from 46 to almost 50 tons, the average number of axles of passenger cars from 2.50 to 2.66, their dead weight per axle from 5.81 to 6.21 tons, the number of axles of freight and baggage cars from 2.04 to 2.05, and their dead weight per axle from 3.69 to 3.87 tons. These are very important alterations in weight. They are to be recommended in the interests of traffic, though they were only obtained at a sacrifice.

The dead load of the trains exceeded, during the years in question, three-quarters of the whole weight of the train (1904, 74.1 per cent.; 1908, 75.2 per cent.).

By far the greater part of the new freight locomotives have four coupled axles, and the greater part of the new passenger locomotives three. At the end of 1908 two-axle passenger cars, which in 1904 represented three-fifths of the total, formed less than a half. They have, for the greater part, been replaced by three-axle cars, which formerly represented less than one-third of the total, whereas their number now equals two-fifths of the whole number of passenger cars. The 8 and 12-wheel passenger coaches are, as far as numbers go, left in the background, although they really represent the most considerable percentage increase. If we consider the increase in seating accommodation according to classes, we find that the fourth-class seats have increased by considerably more than a half, the third-class ones by about one-fifth, the second-class ones by from one-sixth to one-seventh, and the first-class by barely one-tenth. The increasing demand for the lower classes justifies these differences. In the case of freight cars the increase in the number of covered cars is fairly even with that of the open vehicles; that is to say, about one-fifth. In the years 1909 and 1910, however, there was, according to all accounts, a greater increase in covered cars, to meet the requirements of shippers, as demonstrated on frequent occasions.

The newly formed German *Staatsbahnwagenverband* had also exercised a quickening influence as regards the acquisition of rolling stock, since the year 1909. The separate railway administrations have undertaken to increase their rolling stock in accordance with a fixed plan, and in such a way as to ensure its corresponding, as far as possible, with their own share in the total traffic at any given moment. The scarcity of high-capacity cars, frequently in evidence during former years, has in recent years been remedied with thorough success. Whereas, at the end of 1904 the average tonnage was 12.9 tons, in 1908 it was 13.6. The creation of the *Staatsbahnwagenverband* rendered necessary a unit specification, applicable to the whole of Germany, of those goods which would require cars of a higher capacity. It is natural that, in this respect, it was found impossible to comply everywhere with all the wishes of the shippers. The increase in the number of cars has, however, since made further progress, so that the *Verband* has been enabled to meet extensive requirements.

To enable the parties concerned to co-operate in the determination of the goods to be assigned to the high-capacity cars, it was decided at the beginning of 1910, that the list of such goods should be specified by the standing tariff committee of the German railways, to which is attached a committee of those interested in traffic matters, with a deliberative voice.

A further important improvement of the rolling stock is to be found in the comprehensive increase of braking appliances. In the case of passenger cars, the number of braking appliances was, in 1904, 82.61 per cent., and in 1908, 85.13 per cent. of the whole number of axles; in the case of freight and baggage cars the percentage was 34.77 in 1904 and 35.97 in 1908. The equipment with continuous brakes has likewise been considerably extended. Locomotives so equipped represented, in 1904, 58 per cent. of the total number, a percentage which in 1908 had risen to 62 per cent. The number of passenger coach axles equipped for continuous brakes, although representing, in 1904, 90.5 per cent. of the total number, had increased by the end of 1908 to 91.2 per cent. The corresponding figures for freight car axles are 4.3 and 4.9 per cent. The freight cars thus equipped are primarily employed for fast freight trains.

These exertions with a view to the construction of still larger and more efficient locomotives and cars in order to increase speed and safety and cope with traffic on a large scale, were accompanied by a parallel movement for the utilization, for traffic of less intensity, of locomotives and cars which were not unnecessarily heavy, the object being to obtain a more frequent sequence of trains by employing lighter rolling stock. This led, especially on the Prussian state railways, to the introduction of self-contained motor cars for passenger traffic. This form of traffic has grown rapidly during the course of the last five years. At the end of 1908 there were 225 motors owned by the German lines, as against 54 at the end of 1904. In Prussia they are almost exclusively driven by electricity, partly by means of an overhead line and on secondary lines with accumulators. Outside of Prussia—certain private lines excepted—they are only used to any appreciable extent on the Bavarian and Wurtemberg state railways, being on the latter exclusively driven by steam. The success expected from the use of these cars has up to quite recently led to a constant increase in their number.

Only a passing reference will here be made to further details of the technical improvement of the rolling stock:—

It was found possible to increase considerably the capacity of the locomotives by the adoption of superheated steam, following the lead given by the Prussian state railways. Lighting has been improved, mainly owing to the introduction of the hanging type of incandescent gas light. A certain amount of success has been obtained with new loading and unloading appliances on freight cars, while trials carried out with a number of other appliances, such as, for example, automatic couplers, the Knorr freight train continuous brake on steep grades, and appliances to prevent trains from running past stop signals, etc., have, in spite of the fact that they have not as yet been brought to a conclusion, been attended with valuable results.

[The next installment of Dr. Peters' paper will take up traffic conditions.]

MAKING RATES FOR A NEW RAILWAY—AN OBJECT LESSON IN ECONOMICS.

There are still some young railways in the West. Howbeit, owing to the policy of our Uncle Sam, most of them are the children of older systems, for a railway orphan in this era of regulation is, of all orphans, the most forlorn and neglected.

Down the deep canyon, torn through the mountains between Idaho and Oregon by the mighty Snake river, runs the newly constructed "Northwest Line," a branch of the Oregon Short Line, itself a part of the Harriman system. For a distance of 58 miles from Blakes, Ore., its junction with the parent line, the rails follow the Oregon bank of the great stream: sometimes in a narrow valley between the foot hills and the river; sometimes in a box canyon, where the road had to be blasted through solid rock; sometimes through tunnels or across long trestles, which afforded the only path for the rails. The Homestead mine, a large copper property, formed the objective. The low price of iron ore has brought operations to a standstill there, but later they will probably be resumed. There are other smaller mining properties at varying distances from the new railway; there is some fruit and grain and hay in the adjacent valleys; there is a limited quantity of livestock and wool; perhaps a little lumber, with some inbound merchandise and a light passenger traffic.

On the completion of the line the vice-president and general

manager took an inspection party over it, consisting of some of the construction, operating and traffic officers. Everywhere along the track gangs of men were still at work, cleaning out cuts where rock and clay had fallen into them under the action of the elements, leveling up the track where it was still settling, constructing sidings and turnouts, erecting necessary buildings, etc. Much of this cleaning and leveling and refinishing must be done over and over again while the line is new. During the lulls in the discussion of these activities among the operating officers the head of the road asked questions of the traffic men as to whence the revenue was to come to make the new road a paying concern.

"Here is the railway," he said; "how is traffic to be developed and what rates are to be made on the business to be handled here, considering that this construction was very expensive? These ties, for instance," he remarked, "cost us over eighty cents apiece. The rails cost much more now than formerly. The labor is higher. These great rock cuts and tunnels and trestles you see here cost thousands and thousands of dollars, and the cars and engines which we will use, and the men who will run them, all cost the company more than ever. The problem is now, how are we going to get a return on such an investment?"

"This business," commented one of the engineers, "which we will move here, should pay accordingly; and you traffic men, I suppose, will bear in mind the expense of constructing and operating this line in making up your freight tariffs."

The general freight agent was contemplating the fierce rapids of the Snake, beside which the train was moving. He had asked many questions of the people at various stops along the line. Where was the fruit? What was it? Apples? Pears? Peaches? Prunes? How many acres in orchard? How many bearing? What valleys produced the grain and hay? How much was there? Of what varieties? Wheat? Oats? Barley? Alfalfa? Timothy? Where was it marketed? What price did it command? Any flour mills? Where did the stock range? What kinds? Sheep? Cattle? Horses? How many? How much wool? Where was the timber? How much? What sorts? Any sawmills? What did the mines produce? Gold? Silver? Lead? Copper? Ores free, milling or refractory? High or low grade? What volume? How much wagon haul? What towns were there? How many people? How far from the railway? How many acres under cultivation? How many in meadow? etc. There wasn't much in the canyon itself and one couldn't see out of it over into the adjacent valleys, so one had to ask. The general freight agent questioned over and over again, checking each man's answer against the others and striking an average. He was curious—a regular interrogation point on these matters—and he made many notes; but, strange as it may seem, did not question the general manager or the operating or construction officials about the cost of the road or inquire about the stock or bonds or taxes or cost of operation, maintenance or administration. Seeing that he was the one who would have to make the rates, one kept wondering when he would get around to these important matters; but, curious as he was about some things regarding which he questioned the people where the train stopped, between stations he puffed his cigar, listened to the operating talk in a nonchalant sort of fashion and watched the whirlpools in the water or the feathery wreaths of cloud that hung along the mountain sides on the Idaho shore. It's a magnificent canyon, this canyon of the Snake, and will be better known some day.

"Well! how about it?" said one of the division superintendents at last. "Are you going to make it pay or not? It seems to be up to your freight department now. There's no passenger business here. Is she going to be a payer or a loser?"

"It will all depend," answered the freight man, "on what traffic we can develop. I suppose there were estimates before the line was built, but only actual experience will show how near they were right."

"Well," said one of the engineers, "you can easily find out how much fruit and grain and hay and livestock and ore and lumber there is to move, can't you, and then ascertain the cost of maintaining and operating the property, including fixed charges and taxes, and add a fair profit and make your rates accordingly?"

"That's the way we ought to be able to do it, I suppose, according to some theories I hear," said the general freight agent. "It's a pity we can't get some of these fellows here and let them try their hand at it where there are no rates yet made to embarrass them. It sounds very simple, certainly, but suppose, when I have figured it all out according to that simple plan and apportion a part of that charge to each class of business, some of the business won't move? What then?"

"Won't move?" queried the chief engineer. "Why, it would have to move, wouldn't it? There is no other way for it to go. Why wouldn't it move?"

"Well," said the general freight agent, "suppose the rates made in that way were too high to move it? Now, let us take one thing at a time and let me illustrate. Suppose we take fruit: we know it has to go to market. Some of it, possibly, will move to local points on class rates, but the larger quantity must seek common markets where it must be sold at a price against fruit grown in other sections. Our rate, then, must be such that the orchardist can pay it and have left a profit which proves attractive to him, or he won't raist fruit, will he? These people are not going to swap dollars for our benefit. Even those who have orchards already in bearing will allow the fruit to rot or feed it to hogs rather than ship it unless it is worth while. Certainly no new orchards will be set out. As to fruit, then, you see our rates have to be made practically the same as if we had another railway here in the canyon. We haven't any, of course, and it is not direct railway competition we have to meet, but market competition or competition of commodity in this instance fixes the rate for us. When I come to make rates on this fruit here I will have to make them with that in view and make them so they will move the traffic, not alone in prosperous years, but in all years, the least favorable conditions eventually setting our measure, because when I put the rates down to meet those conditions it will be next to impossible to get them back up again. It is the same with the other commodities. Take ore, for instance. Some of this ore here of the higher grades may move under the ordinary distance tariff, but on much of it which is of lower value we will have to apply very low rates so that the mines can afford to produce it at all. On some of it a team haul to the railway must be considered. It won't matter what our expenses are, great or small, or what our capitalization or interest charges or taxes are. It will be take it or leave it. I will have to make rates according to the conditions surrounding the traffic or there will be no traffic, or at least very little. Of course, I won't make any rates lower than the actual cost of moving the business, but I will have to make many which will yield only a little bit over that, because that is all the traffic will stand. You can't get any fixed charges or maintenance charges out of those lower kinds of business. You can only get the *moving* cost and some little besides."

"In other words," said one of the listeners, "all the traffic will bear?"

"No," replied the general freight agent, "not that at all. Not all the traffic will bear, for your business will never grow under such a policy, but what each variety of traffic is reasonably able to bear (which is sometimes very little, indeed) and make the business so profitable to the producer that it thrives and grows and yields a volume that finally will make our property a paying property. In other words, we have to make other people's business prosperous to make our own pay. You will find it the same with all these other commodities; hay, grain, livestock, lumber, etc.; we have got to develop that business here, and while you gentlemen's conversation about cost of construction, etc., is interesting, it doesn't help me in making rates. From the whole volume of the traffic I must try in some way to pay these expenses, fixed charges, taxes and all, if I can, plus a profit, too, if I can get any. Maybe I can, and maybe not. I will do my best, but my rate making is circumscribed by conditions I cannot

control. It is all right to theorize about it in generalities, but dealing with it in detail, which is the only way I am able to deal with it, I have to be governed by the circumstances of the particular case. It has little connection with your cost of doing business. You make that as low as you can. I'll develop all the traffic and get all the revenue I can, and we'll hope for the best."

"How about your inbound business?" asked the general superintendent. "I haven't heard that mentioned here."

"It will largely take care of itself," responded the freight man. "It's the outbound business we have to think of first. That is the business we have to look out for to develop traffic. There can be no inbound business until there is outbound business, because the people must produce something at a profit themselves before they can buy other people's goods and ship them in here."

"But you have to have rates, don't you?"

"Oh, yes; we'll begin with our regular scale of class rates, the same as we have on other parts of the line, making through rates by adding locals on Blakes. To these we will gradually have to add through commodity rates under the representations of producers elsewhere who want to get their commodities into this market. Coal will have to have a commodity rate, for instance, or the people here will continue to burn wood the same as they did before the railway was built. Then there will be machinery for the mines and mills and brick and building material, etc. We will feel our way along gradually and build our tariff a little at a time as occasion requires. It's all a very practical matter, based on experience and the conditions we find. I can't give you any theoretical rule for it, because there isn't any, any more than for other people's price making."

"Meantime, then, you don't care very much what it costs to build the line or what it costs to run it?" observed the chief engineer.

"Well, certainly, I care a great deal," said the general freight agent, "but those things don't give me any standard for making the rates, because in practical business it can't be done that way. I keep as much above the *movement* cost as possible and try to build up a large traffic, so as to meet not only that but maintenance charges, interest and taxes; then, if possible, to earn a little surplus for betterments and to tide over bad years which are sure to come, and some day, we hope, also, dividends; but I can't fix in my mind what I want to earn and then say arbitrarily that I will get it out of this traffic. People who think it can be done that way don't understand it, that's all. Some day, perhaps, we'll have a through line along this grand old canyon and the passenger department can do something to help us realize your expectations."

"But in the meantime," queried the general manager, "we'll have to take our chances? Is that it?"

"In the meantime that's just what you'll have to do, and run the risk not only of no dividends, but of no surplus to keep the road up in shape; perhaps not even fixed charges, and so at last get a receiver, as other roads have done. Having the big, strong Oregon Short Line behind the baby here, I suppose we need not fear that, but you needn't be surprised if the O. S. L. has to dip down in its pocket to pay this kid's way for some time to come. It needn't happen if rates could be made as some of our college professors and politicians tell us is or should be done, but the trouble is they can't, theories to the contrary notwithstanding. Hello! here we are back at Blakes at last. Come on; let's get ready for supper."

GROWTH OF POPULATION, RAILWAY EARNINGS AND TAXES.

The accompanying table makes an interesting comparison between the growths of the population, gross freight and passenger earnings, railway taxes, and customs and internal revenue collections of the United States since 1871.

The per capita figures show that there has been a very substantial decrease since 1871 in the amount paid per capita in customs and internal revenue duties. Meantime, railway freight and passenger earnings and railway taxes per capita have very substantially increased. Increases in railway earnings per capita are particularly significant in view of the fact that, as is well known, the average rate per ton per mile and the average rate per passenger per mile have very substantially decreased. Not longer ago than 1890 the average rate per ton per mile was 9.41 mills, while in 1909 it was but 7.63 mills, a decrease of almost 19 per cent. Meantime, gross freight earnings increased from $11.46 per capita to $20.36 per capita, or 77 per cent. Similarly, while the average rate per passenger per mile was declining from 2.17 cents in 1890 to 1.93 cents in 1909, passenger earnings per capita of population increased from $4.36 to $6.82, or 56 per cent.

It is significant that the increase in railway taxes per capita was from practically 50 cents to practically $1, or 100 per cent., while freight earnings per capita were increasing 77 per cent. and passenger earnings per capita 56 per cent.

POPULATION, GROSS FREIGHT AND PASSENGER EARNINGS AND TAXES OF RAILWAYS, AND CUSTOMS AND INTERNAL REVENUE OF THE UNITED STATES.

Year.	Population.	Railway Earnings† Gross Freight.	Railway Earnings† Gross Passenger.	Railway Taxes.	U. S. Revenue-Collections Customs.	U. S. Revenue-Collections Internal.
Totals.						
1871	39,718,112*	$294,430,322	$108,898,886	.....	$197,063,404	$146,145,173
1880	50,155,783	468,797,838	154,448,612	.....	174,502,640	125,982,918
1890	62,622,250	717,739,439	273,494,706	$31,207,469	213,913,534	139,488,483
1900	75,568,686	1,033,535,351	331,753,643	48,332,273	216,379,716	263,745,303
1909	88,262,446*	1,796,256,314‡	601,722,959‡	89,026,226	300,711,934	246,212,644
Per Capita.						
1871		$7.413	$2.742	.....	$4.962	$3.679
1880		9.347	3.079	.....	3.479	2.512
1890		11.461	4.367	$0.498	3.411	2.228
1900		13.677	4.390	0.640	2.863	3.490
1909		20.363	6.817	1.009	3.420	2.790

* Estimated. † Fiscal year. ‡ Calendar year.

Note.—With exception of 1909, the U. S. revenue statistics are taken from an average of the five years of which the year given is the center year. This is also true of the railway earnings for the years 1890 and 1900, but for 1880 an average of only the years 1879-80-81 was taken, and for 1871 and 1909 just the earnings for those years. The earnings for 1871 and 1880 include miscellaneous, which was not reported separately at that time, but this item has been eliminated from the reports for the following years.

According to press reports the concession for the construction and operation of a railway between Ascunion, Paraguay, and the mouth of the Yguassu river on the Alto Parana, Brazil, which was granted to Signor Andres R. Fary on June 1, 1909, has been transferred, with the Paraguayan Government's sanction, to the San Paolo-Rio Grande Co., of Brazil. The new concessionaries will also build a connecting line from the port of San Francisco, in the state of Santa Catharina, Brazil, to the mouth of the Yguassu river. The Paraguayan and Brazilian sections together will afford a shorter outlet to the sea for Paraguayan products than any which has previously existed, and will increase facilities of communication between Paraguay and Brazil. Under the terms of this concession the company agrees to finish a 93-mile section of the main line within two years, approximately as far as Ajos, and within four years after beginning the work the entire line must be finished.

General News Section.

At Pau, France, December 9 Mr. Legagneux, in a Bleriot monoplane, rose to a height of 10,499 ft.; but came down half frozen.

The Hadley Commission, investigating the question of governmental regulation of railway securities, meets in New York city today, December 16.

F. D. Underwood, president of the Erie Railroad, has given his farm at Wauwatosa, Wis., to the town, to be used as a public park and a model farm school.

Boston & Maine passenger cars which come into the road's repair shops in New Hampshire are being in some cases repainted and relettered "New York, New Haven & Hartford."

The Southern Railway and the Mobile & Ohio have discontinued the employment of train auditors on a number of passenger trains, and it is reported that all train auditors will be taken off next month.

W. J. Cunningham, statistician in the office of Assistant General Manager Hustis of the Boston & Albany, at Boston, has been appointed assistant professor of economics at Harvard University. He retains his position with the railway.

The Texas state commissioner of labor has entered suit against the Missouri, Kansas & Texas to punish it for the crime of having three locomotives repaired at shops outside of Texas. To have locomotives owned in Texas repaired in other states, is contrary to law.

The work on the Cape Cod ship canal has progressed so for that the excavation at one end is being used as a harbor by fishing vessels, and the canal company is planning to build a dock 1,200 ft. long at Sandwich. A great deal of work has been done on the breakwater at Sandwich.

At Shelbyville, Ill., recently, the porter of a Pullman car sold intoxicating liquors; and as Shelbyville is a "dry" town, the railway company, the Cleveland, Cincinnati, Chicago & St. Louis, was called into court, and has paid a fine of $200 and costs. A suit filed against the Pullman company was dismissed.

At Los Angeles, Cal., a man who was formerly a station agent of the Atchison, Topeka & Santa Fe, at Visalia, has been arrested by the federal authorities for misuse of a pass. He obtained a pass for his wife from Albuquerque to Visalia and then allowed it to be used by another woman, a friend of the family.

The Lewis Institute, Chicago, announces the opening of the winter quarter on January 3. The enrollment in the Institute is the largest in its history, day and night students together totaling 2,700. Of the 550 men in attendance in the day school, the majority are taking engineering, there being 21 candidates for the degree in mechanical engineering.

The Pennsylvania Railroad, which has discontinued its ferry from Twenty-third street, New York, to the Pennsylvania Station, Jersey City, has applied for the renewal of the lease of the piers at Twenty-third and Twenty-fourth streets, to be used for a freight station. The Anchor Line (steamships) has made application for a part of the same property.

There is a bill before congress to appropriate money for the construction or improvement of a harbor at Montauk Point, near the east end of Long Island; and Messrs. J. Pierpont Morgan and James McCrea, who visited the White House last week, are said to have advocated the establishment of a deep water landing at that place with a view to shortening the time of transit for passengers and mails between New York and Europe. Montauk Point is about 120 miles east of New York.

The American Red Cross Society proposes to give instruction in first aid to the injured throughout the country, the society having been presented by the Pullman company with a car, which it is expected the railways will haul from city to city without charge. The car will be fitted up with a "rescue station," by means of which object lessons will be given. The car will be sent not only to railway centers but also into mining districts. It will be in charge of Dr. M. W. Glasgow, of Birmingham, Ala.

The German Reichstag has passed the second reading of the bill establishing labor chambers composed equally of representatives of the employers and of the laborers to settle labor questions and to fix regulations for employers and labor organizations according to the industry and district in which it is located. The Reichstag voted an amendment making the secretaries of labor unions eligible for membership in the chambers, but Herr Delbrueck, Minister of the Interior, declared that the government would refuse to accept the bill in this form.

The constitutional convention in Arizona has adjourned. It has adopted, for reference to the people February 9, a constitution which is declared by its friends to be the most progressive ever framed and by the minority as the most socialistic. All sorts of new and little-known schemes are included in it. The sections regulating corporations are rigid, and there is a clause providing for the physical valuation of railways "as a basis for the control of rates." The corporation commission is to have extensive powers. The fellow-servant doctrine is abrogated.

Representatives of employees of the Boston & Maine have voted against receiving pensions from the company, and are said to be in favor of sticking to the Boston & Maine plan, which was formulated a year or two ago, but which was never put in force. President Mellen, speaking to the committee, told them that the New Haven road had voluntarily put in force "the Pennsylvania plan"; and he proposed apparently to do the same for the Boston & Maine; but the employees preferred their own plan, under which the employees would contribute to the pension fund: this on the ground that the pensions paid by the company would not alone be large enough to satisfy the men. The Boston & Maine plan, which was described in the *Railway Age Gazette* of July 9, 1909, was made the subject of a special act by the Massachusetts legislature; and to be valid, it would have to be adopted by a two-thirds vote of all of the employees.

Negotiations between the committee of railway officers headed by W. B. Scott, assistant director of maintenance and operation of the Harriman lines, and representatives of the Brotherhood of Locomotive Engineers, were renewed in Chicago on December 13. The railway officers renewed their offer of advances in wages averaging 9½ per cent., and suggested that if the employees did not want to accept this the entire matter should be submitted to mediation by the government mediators, the Chairman of the Interstate Commerce Commission and the Labor Commissioner. The renewal of the negotiations followed the canvass on December 10 of the vote of enginemen on 60 western railways on the question of whether the officers of the Brotherhood should be authorized to declare a strike. That is, it is understood that this was the proposition put to the employees. The officers of the Brotherhood refuse to state just exactly what the vote meant. Whatever it did mean, the vote was practically unanimous in giving to the officers of the Brotherhood the authority for which they asked.

Cost of Transportation in New York City.

The question is asked, how it is, with subways and a five-cent fare all over the city, the surface roads can claim that a five-cent fare all over a single borough on the surface cars is ruinous. The answer is simple. The subways have only a nominal accident account, as the whole line is unobstructed. The surface roads have paid as much as $2,250,000 of accident claims in one year, which is equal to 45,000,000 fares.—*New York Tribune.*

The Upper Berths.

The papers are cheering rather loudly about the great victory over the Pullman company; but it happens that there are experienced travelers who ask for the upper when they journey; it has its advantages. But the meanest thing is the order that when a passenger buys a lower berth the porter who makes it up for him must at the same time drag down and make up the upper unsold and undesired. It is the same in principle as if the railway required the brakeman to dump a bag of potatoes beside every passenger in the ordinary coach who had a seat all to himself, the bag to be left there until somebody came along who

needed the place, unless the pasenger could produce two tickets. The only defense that has been attempted for this extortion is that otherwise porters will for a bribe leave the uppers up and discourage those who would buy them. But the idea of kicking at the public giving money to Pullman porters; it's the way those fellows get their pay and the company knows it.—*Hartford Courant.*

The Inventors' Guild.

This is the name of an association incorporated in New York City, the object of which is to advance the application of the useful arts and sciences, to further the interests and secure full acknowledgment and protection for the rights of inventors and to foster social relations among those who have made notable advances in the application of the useful arts and sciences. The members propose to improve the conditions of inventors by attacking the causes of delays in the patent office and the ineffectiveness of its work; the expense and tardiness of litigation, and the possibility under which a rich corporation may, by prolonging a suit, increase the expenses to a point which makes such suits prohibitive for a poor inventor, and other things. The membership of the Inventors' Guild is limited to fifty and admission is carefully guarded.

The officers are Ralph D. Mershon, 60 Wall street, president; Charles W. Hunt, first vice-president; Charles S. Bradley, second vice-president; Thomas Robins, 13 Park row, secretary. The governors are Ralph D. Mershon, Leo H. Baekeland, Charles W. Hunt, Charles S. Bradley, Michael I. Pupin, Peter Cooper Hewitt. Among the 29 members are Bion J. Arnold, Thomas A. Edison, Stephen D. Field and James Gayley.

Trial of the Perry-Prentice Automatic Stop on the Canadian Pacific.

The Perry-Prentice wireless apparatus for operating a cab signal and for applying the brakes, has been fitted to locomotive No. 798 of the Canadian Pacific; and the apparatus was successfully tried, with a train of twelve freight cars, near Toronto on December 8. In this apparatus a coherer on the locomotive is actuated by Hertzian waves from a current flowing through a wire which is strung along the line of the road. In the Canadian Pacific experiments, this wire is laid in trunking on the ties between the rails, and the antenna connecting with the coherer is suspended beneath the engine, so as to be carried along about 6-in. above the trunking. The line of the Canadian Pacific between North Parkdale and West Toronto has been equipped with six block sections, each about half a mile long, and the circuit (alternating current) in the wire in the trunking and which is used for actuating the stop is controlled by the track relays of the block sections in a manner similar to that used to control distant signals. The wire in the trunking extends throughout the length of the road signaled, and is arranged to normally hold the cab apparatus in the proceed position; and the stop or caution indication is produced by opening the circuit. The apparatus in the cab is arranged so that the first effect of a caution signal is to sound a whistle; and the automatic application of the brakes does not take place until three seconds after the sound of the whistle. This apparatus was described in the *Signal Engineer* of February, 1909.

New York City Railways.

The New York State Public Service Commission, first district, appears to have finally approved the proposal of the Interborough Rapid Transit Company to build third tracks on its Second, Third and Ninth avenue elevated lines in Manhattan. At any rate, the commission has adopted a form of certificate, and a public hearing is to be held on December 23. Any such addition to the elevated lines would require the approval of the Board of Estimate and Apportionment of the city. The Interborough's plans also contemplate the extension of the Ninth avenue line northward to the north limit of the city (Woodlawn); and of the Third avenue line to the same extent. These extensions are a part of the recent proposal of the Interborough to operate the new subways which it is expected the city will build, but apparently the action here outlined contemplates the construction of these elevated additions and extensions whether the subway is or is not constructed.

The Board of Estimate and Apportionment has agreed with the Public Service Commission in approving the plan proposed by the Interborough for the operation of the Steinway tunnel. This tunnel extends from Forty-second street and Madison avenue, Manhattan (Grand Central Terminal) under the East river to Astoria in the borough of Queens. The plan involves the expenditure of $1,500,000 for putting the tunnel into condition for operation, which expenditure will have to be borne by the city.

Employees' Demands on Legislators.

One of the worst moves ever made on the part of the railways was getting out of politics. The men who brought this about are now dead and unfortunately cannot know the full ill effects of the work they accomplished. Since the railways have abstained from the political game more legislation adverse to them has been passed than in a period of fifty years previously. The employees in the recent election appointed committees composed of Brotherhood members in each election district to quiz the various candidates for election to Congress and state legislatures concerning their stand on labor legislation. Upon receiving replies the committee advised the members of the various orders for whom they should cast their votes. These questions related to the Boiler Inspection Bill; to the Obstruction or Clearance Bill; the proposed bills prescribing the minimum number of experienced employees that shall constitute a train crew and limiting injunctions; also an amendment to the Federal Liability Law, eliminating the question of contributory negligence and amending the law so that it will make the employer liable for all casualties received while in service except for such as are caused by the serious or willful misconduct of the employee. Candidates were also asked whether they would lend assistance to the defense of any of the measures enacted for the protection of employees if attempts are made to abrogate or amend such laws to the disadvantage of the employees. Here is a menace to the railways. No candidate can afford to ignore the labor vote, nor can he afford to ignore his pledges after election. * * * The opposition to compulsory arbitration on the part of the employees is logically wrong. If the railway is a public servant, so also are its employees. Can they be permitted to be a law unto themselves? Should they be permitted to tie up the operations of a railway at will?—A "Prominent President," in the *Wall Street Journal.*

Losses Due to Railway Strike in France.

L'Officiel recently published a statement of the losses in receipts sustained by the state and other railway companies in the recent strike in France.

It had previously reported that for the forty-first week of 1910, when the strike was broken, there was a deficit of 3,379,000 francs ($675,400) in the receipts of the six great companies. The loss was still more during the forty-second week. The following table shows the amount and percentage by which the receipts for the period were less than for the corresponding period of 1909:

Western-State	1,130,000 fr.	($226,000)	or 26.5 per cent.
Northern	2,002,000 fr.	($400.400)	" 35.7 "
Paris, Lyons & M.	670,000 fr.	($134,000)	" 5.5 "
Eastern	620,000 fr.	($124,000)	" 12.6 "
Orleans	577,000 fr.	($115,400)	" 9.8 "
Southern	463,000 fr.	($92,600)	" 18.2 "
State (old)	88,500 fr.	($17,700)	" 6.9 "

The second week of the strike caused a loss to the state and the companies of more than 5½ millions. Then, in addition to this total, the strike cost the state 9,000,000 francs ($1,800,000) either directly or indirectly in interest guaranteed for the other companies, and that without taking into account the losses of commerce, manufactures and agriculture, because of the suspension of the facilities of transportation.

Railway Appliances Association.

The Railway Appliance Association will hold its annual exhibition of railway appliances used in the construction and maintenance of railways at the Coliseum, Chicago, March 20 to 25, inclusive, 1911. The exhibition will occupy the entire main floor, annex and balcony. Of the 49,000 sq. ft. devoted to exhibits, about 40,000 sq. ft. have been already secured by the different exhibitors, leaving only 9,000 sq. ft. yet to be sold.

Among the extra attractions which have been secured and

which will be shown in the balcony, is a model of Brennan's Mono-Rail Car in full operation.

Applications for space should be made to John N. Reynolds, secretary, 303 Dearborn street, Chicago.

Following is a list of the exhibitors who have secured space:

Adams Bros., Chicago.
Adams & Westlake Co., Chicago.
Ajax Forge Co., Chicago.
Alamo Manufacturing Co., Hillsdale, Mich.
Alexander Crossing Co., Clinton.
Allith Manufacturing Co., Chicago.
American Concrete Co., Chicago.
American Guard Rail & Fastener Co., Philadelphia, Pa.
American Hoist & Derrick Co., St. Paul, Minn.
American Nut & Bolt Fastener Co., Allegheny, Pa.
American Railway Signal Co., Cleveland, Ohio.
American Rolling Mill Co., Middletown, Ohio.
American Steel & Wire Co., Chicago.
American Valve & Meter Co., Cincinnati, Ohio.
American Vulcanized Fibre Co., Wilmington, Del.
American Well Works, Aurora, Ill.
Armspear Manufacturing Co., New York.
Asphalt Ready Roofing Co., New York.
Baird Electric Co., Chicago.
Barrett Manufacturing Co., New York.
Bausch & Lomb Optical Co., Rochester, N. Y.
Beaver Dam Malleable Iron Works, Beaver Dam, Wis.
Bosser, W. F., Manufacturing Co., Utica, N. Y.
Bowser, S. F., & Co., Ft. Wayne, Ind.
Bryant Zinc Co., Chicago.
Buda Company, Chicago.
Buyers Index Co., Chicago.
Cambria Steel Co., Johnstown, Pa.
Card & McArdle, Waukegan, Ill.
Carnegie Steel Co., Pittsburgh, Pa.
Carpenter, George B., & Co., Chicago.
Chicago Bridge & Iron Works, Chicago.
Chicago Steel Tape Co., Chicago.
Cleveland Frog & Crossing Co., Cleveland, Ohio.
Cook's Standard Tool Co., Kalamazoo, Mich.
D. & A. Post Mold Co., Three Rivers, Mich.
Detroit Graphite Co., Detroit, Mich.
Dickinson, Paul, Inc., Chicago.
Dietzgen, Eugene, Co., Chicago.
Dilworth, Porter & Co., Pittsburgh, Pa.
Dressel Railway Lamp Works, New York.
Duplex Metals Co., New York.
Eastern Granite Roofing Co., New York.
Economy Separable Switch Point Co., Louisville, Ky.
Edison Manufacturing Co., Orange, N. J.
Edison Storage Battery Co., Orange, N. J.
Electric Storage Battery Co., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago.
Federal Signal Co., Albany, N. Y.
Foster, Frank M., Columbus, Ohio.
Franklin Manufacturing Co. of Penna., Franklin, Pa.
General Electric Co., Schenectady, N. Y.
General Railway Signal Co., Rochester, N. Y.
Gifford-Wood Co., Hudson, N. Y.
Goheen Manufacturing Co., Canton, Ohio.
Peter Gray & Sons, Boston, Mass.
Greenlee Bros. & Co., Rockford, Ill.
Grip Nut Company, Chicago.
Hall Signal Company, New York.
Handlan-Buck Manufacturing Co., St. Louis.
Harry Bros. Co., Newport, Ky.
The Hart Steel Co., Elyria, Ohio.
Hayes Track Appliance Co., Geneva, N. Y.
The Hobart Allfree Co., Chicago.
Hubbard & Co., Pittsburgh, Pa.
Hurley Track Laying Machine Co., Chicago.
Ideal Concrete Machinery Co., South Bend, Ind.
Indianapolis Switch & Frog Co., Springfield, Ohio.
Ingalls Shepard Forging Co., Chicago.
Interlocking Nut & Bolt Co., Pittsburgh, Pa.
Johns-Manville, H. W., Co., New York.
Jordan, O. F., Co., Chicago.
Joyce-Cridland Co., Dayton, Ohio.
Kalamazoo Railway Supply Co., Kalamazoo, Mich.
Kenly, W. K., Co., Chicago.
The Kennicott Co., Chicago Heights, Ill.
Kerite Insulated Wire & Cable Co., New York.
Kerlin Automatic Post Machine Co., Delphi, Ind.
Keuffel & Esser Co., New York.
Lackawanna Steel Co., Buffalo, N. Y.
Lehon Company, Chicago.
Lidgerwood Manufacturing Co., New York.
Link Belt Co., Chicago.
Lorain Steel Co., Johnstown, Pa.
Lufkin Rule Co., Saginaw, Mich.
Lupton's, David, Sons Co., Philadelphia, Pa.
Luther Grinder Manufacturing Co., Milwaukee, Wis.
Lutz-Lockwood Manufacturing Co., Aldene, N. J.
Massey Co., C. F., Chicago.
Matthews & Bro., W. N., St. Louis, Mo.
Milburn, Alexander, Co., Baltimore, Md.
Morden Frog & Crossing Co., Chicago.
National Lock Washer Co., Newark, N. J.
National Malleable Castings Co., Chicago.
National Surface Guard Co., Chicago.
Nichols, Geo. P., & Bro., Chicago.
Okonite Co., New York.
Otto Gas Engine Works, Chicago.
Spencer Otis Co., Chicago.
P. & M. Co., Chicago.
Patterson Co., W. W., Pittsburgh, Pa.
Pease Co., C. F., Chicago.
Pennsylvania Steel Co., Steelton, Pa.
Pocket List of Railway Officials, New York.
Potter Winslow Co., Chicago.
Q. & C. Co., New York.
Rail Joint Co., New York.
Railroad Supply Co., Chicago.
Railway Age Gazette, New York.
Railway List Company, Chicago.
Railway and Engineering Review, Chicago.
Ramapo Iron Works, Hillburn, N. Y.
Manganese Steel Co., Hillburn, N. Y.
Roberts & Schaefer Co., Chicago.
Robinson, George M., Dubuque, Iowa.
Scherzer Rolling Lift Bridge Co., Chicago.
Sellers Manufacturing Co., Chicago.
Standard Asphalt & Rubber Co., Chicago.
Standard Paint Co., New York.
Templeton, Kenly Co., Chicago.
Union Switch & Signal Co., Swissvale, Pa.
U. S. Metal & Manufacturing Co., New York.
U. S. Wind Engine & Pump Co., Batavia, Ill.
Universal Metallic Tie Co., Salt Lake City, Utah.
Verona Tool Works, Pittsburgh, Pa.
Waterloo Cement Machinery Corporation, Waterloo, Iowa.
Weisell Nut Lock Co., Chicago.
Welsh, William M., Straight Scale Co., Denver, Colo.
Whall, C. H., & Co., Boston, Mass.
Wharton, Jr., William, & Co., Philadelphia, Pa.
Winan's Improved Rail Joint Co., Portland, Ore.

The American Society of Mechanical Engineers.

The annual meeting of this society, held in New York, December 6 to 9, inclusive, proved to be one of the most successful in the history of the society. George Westinghouse presented his presidential address at the opening session. After briefly referring to the principal events of the society during the past year he called attention to certain misunderstandings which appeared to exist concerning the paper on the standardization of electric railway equipment which he had presented at the joint meeting of the A. S. M. E. and the British Institution of Mechanical Engineers in England. He did not intend to recommend the adoption of one particular system and repeated his specific recommendation to demonstrate this. The remainder and the greater part of his address consisted of a most interesting account of the invention and development of the air brake.

The following officers were elected: Col. E. D. Meier, president; H. H. Vaughan, E. M. Herr and George M. Brill, vice-presidents; D. F. Crawford, E. B. Katte and Stanley G. Flagg, Jr., managers, and Wm. H. Wiley, treasurer. The professional sessions were carried out substantially as outlined in the *Railway Age Gazette* of December 2. On Friday, the 9th, a number of excursions were conducted to various points of interest, one of the most largely attended being that to the works of the Niles-Bement-Pond Company at Plainfield, N. J., where a number of Pond planers driven by reversible motors were in operation.

St. Louis Railway Club.

The annual smoker and Christmas entertainment of the St. Louis Railway Club was held on Friday evening, December 9, in the grand dining room of the Southern Hotel. The speaker was L. O. Armstrong, colonization and industrial agent of the Canadian Pacific, who described points of interest along his line, illustrating them with stereopticon and motion pictures. After Mr. Armstrong's address, lunch was served, this being followed by a vaudeville entertainment.

Traffic Club of St. Louis.

The first noon-day meeting of the Traffic Club of St. Louis was held at the Planters' Hotel on December 14. O. F. Richards, general manager of the Simmons Hardware Company, spoke on the "Parcels Post."

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; next meeting, June 22, 1911; Niagara Falls, N. Y.
AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., 1911.
AMERICAN ASSOCIATION OF LOCAL FREIGHT AGENTS' ASSOCIATION.—G. W. Dennison, Pennsylvania Co., Toledo, Ohio.
AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio.
AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Sept. 17-19, 1911; St. Louis, Mo.
AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION.—E. H. Fritch, Monadnock building, Chicago; March 21-23, 1911, Chicago.
AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; May 6, 1911; Detroit, Mich.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago; June 14-16, 1911, Atlantic City, N. J.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wednesdays, except July and August; annual, Jan. 18-19, New York.

American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 29th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; April 26, 1911; New Orleans, La.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; May, 1911; Montreal, Can.

Association of Railway Electrical Engineers.—G. B. Colegrove, I. C. R.R., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; June 19, 1911; Boston, Mass.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 24 Park Place, New York; June 20-21, 1911, Cape May City, N. J.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug.; Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays; Montreal, annual, last week January.

Car Foreman's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug.; St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday; annual, Jan. 17, 1911; Pittsburgh.

Freight Claim Association.—Warren P. Taylor, Rich., Fred. & Pot R.R., Richmond, Va.; 20th annual, June 21, 1911; St. Paul, Minn.

General Superintendents' Association of Chicago.—H. D. Judson, 209 East Adams St., Chicago; Wednesday preceding 3d Thursday; Chicago.

Indianapolis Railway and Mechanical Club.—B. S. Downey, C., H. & D., Indianapolis, Ind.

International Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; next convention, Omaha, Neb.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago; May 15-18, 1911; Chattanooga, Tenn.

International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

International Railway Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago; June 19-21, 1911, Atlantic City, N. J.

Master Car and Locomotive Painters' Association of United States and Canada.—A. P. Dane, R. & M., Reading, Mass.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept.; Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.

North-West Railway Club.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., except June, July, August; alternately at St. Paul and Minneapolis, Minn.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P.; 4th Saturday; Duluth, Minn.

Omaha Railway Club.—A. H. Christiansen, Barker Blk.; second Wed.

Railway Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City; 3d Friday in month; Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.

Railway Signal Association.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio; annual, May 22-24, 1911; Milwaukee, Wis.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Oct., 1911; St. Louis.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Prudential bldg., Atlanta, Ga.; 3d Thurs.; Jan., April, August and Nov.; Atlanta.

Toledo Transportation Club.—L. G. Macomber, Woolson Spice Co., Toledo; 1st Sat.; annual, May 6, 1911; Toledo.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; 1st Sat. after 1st Wed.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August; New York.

Traffic Club of Pittsburgh.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly; Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 20, 1911; Baltimore, Md.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August; Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Wood Preservers' Association.—F. J. Angier, First National Bank bldg., Chicago; annual, Jan. 17-19, 1911; Chicago.

Traffic News.

The Southern Pacific proposes to spend $200,000 during the coming year in advertising the advantages of Texas as a suitable place for people desiring to settle in a new country.

W. D. Williams, member of the Texas railway commission, will seek to get the commisison to order a reduction in both upper and lower berths in sleeping cars, and establish differentials of about 20 per cent. between the rates.

The State Railroad Commission of Pennsylvania has rejected an application for a recommendation that an additional passenger train be run by the Philadelphia & Reading between Harrisburg and Reading after six o'clock in the evening.

The trunk lines have abandoned their purpose to issue new tariffs, January 1, abolishing numerous allowances on through freight rates to short terminal lines. It is said that the opposition of the Wheeling & Lake Erie and the roads owned by the United States Steel Corporation was what led to this action.

It is reported in Pittsburgh that the Pennsylvania and the Baltimore & Ohio have agreed with the principal shippers of the city on uniform and reduced rates for switching freight from one road to the other. Freight loaded at a store or factory on one line to be shipped over the other, will be transferred at the rate of five cents per 100 lbs. for first class and second class freight, and at two cents for the lower classes.

The Joliet & Southern Traction Company, an Illinois interurban line, has begun a proceeding before the Illinois railway commisison to compel the Chicago & Alton, the Wabash, the Rock Island, the Illinois Central and the Santa Fe to interchange traffic and make joint rates in connection with it. The case was argued in Chicago on December 8. The railways contended that the state commission had no jurisdiction. The commission took the case under advisement.

The St. Louis Southwestern, the Chicago, Peoria & St. Louis, the St. Louis & San Francisco, the Missouri, Kansas & Texas, the Chicago & Eastern Illinos and the Chicago, Rock Island & Pacific have renewed through traffic arrangements and made through rates in connection with the Manufacturers' Railway of St. Louis. Under the arrangements entered into, they are to pay the Manufacturers' Railway $4.50 for each car that it switches between industries located on its tracks and the trunk lines. The switching allowance was withdrawn about a year ago on the ground that the Manufacturers' Railway was a "tap" line. The question of its status is now pending before the Interstate Commerce commission; and the action here noted has already been nullified by an order from the Commission suspending the tariffs.

Hearing Regarding "Tap Line" Allowances.

Commissioner Harlan of the Interstate Commerce Commission began at New Orleans, La., on December 9, hearings on the reasonableness of divisions of through rates made by trunk lines in connection with "tap line" railways. The case of the Butler County Railroad, a 28-mile line in Butler county, Missouri, was the first heard. W. N. Barron, vice-president, said the road was organized under the laws of Missouri in September, 1905, to haul a large amount of hard wood timber along it. This timber is being cut and made into barrels for the American Sugar Refining Company and the Brooklyn Cooperage Company. The road has made it possible for three villages to spring up, he said. The line has a contract for carrying mails. An officer of the Crittenden Railroad, a 27-mile "tap line" in Arkansas, said this road is controlled by the Crittenden Lumber Company. He said that between 35 and 40 per cent. of its business comes from the Crittenden Lumber Company, but that the road does not favor this company in the distribution of cars.

Crop Conditions.

The department of agriculture estimates the crop conditions as follows:

Winter Wheat—Area sown this fall 2.5 per cent. more than the revised estimated area sown in fall of 1909, equivalent to an increase of 828,000 acres, the indicated total area being 34,485,000

acres. The condition on December 1 was 82.5, against 95.8 and 85.3 on December 1, 1909 and 1908, respectively, and a ten-year average of 91.3.

RYE—Area sown this fall 1.2 per cent. less than the revised estimated area sown in fall of 1909, equivalent to a decrease of 25,000 acres, the indicated total area being 2,138,000 acres. Condition on December 1 was 92.6 against 94.1 and 87.6 on December 1, 1909 and 1908, respectively, and a ten-year average of 93.5.

Details by states follow:

WINTER WHEAT.

STATES	Area Sown. Autumn, 1909, Revised. (000 omt'd). Acres.	Autumn, 1910. Comp'd with 1909. P. c.	Autumn, 1910. Total Preliminary. (000 omt'd). Acres.	Condition December 1, 1910. P. c.	1909. P. c.	10-Year Average. P. c.
New York	451	102	460	96	96	94
New Jersey	114	100	114	91	92	93
Pennsylvania	1,593	100	1,593	90	86	91
Delaware	125	99	124	75	88	91
Maryland	803	102	819	80	85	90
Virginia	820	100	820	81	85	98
West Virginia	425	99	421	83	91	87
North Carolina	672	105	706	83	89	90
South Carolina	473	108	511	87	92	93
Georgia	275	97	267	88	90	94
Ohio	2,036	104	2,117	91	95	85
Indiana	2,765	101	2,793	84	98	89
Illinois	2,250	103	2,318	82	100	90
Michigan	920	105	966	94	94	87
Wisconsin	70	108	76	96	97	94
Iowa	239	113	270	92	98	95
Missouri	2,207	102	2,251	83	98	92
Nebraska	2,767	103	2,850	90	98	96
Kansas	6,300	102	6,426	73	98	93
Kentucky	800	99	792	83	97	89
Tennessee	975	99	965	80	95	90
Alabama	140	108	151	89	95	94
Mississippi	5	200	10	92	94	92
Texas	1,295	103	1,334	71	95	93
Oklahoma	1,604	103	1,652	58	98	92
Arkansas	200	112	224	82	93	89
Montana	320	121	387	97	99	...
Wyoming	45	120	54	100	95	...
Colorado	116	118	137	90	93	...
Utah	160	109	174	87	97	...
Nevada	15	115	17	100	...	...
Idaho	350	112	392	95	100	97
Washington	730	103	752	96	93	91
Oregon	497	111	552	98	94	95
California	1,100	90	990	90	100	95
UNITED STATES	33,657	102.5	34,485	82.5	95.8	91.3

The total production of cotton in the United States for the season of 1910-11 will amount to 5,464,597,000 lbs. (not including linters), equivalent to 11,426,000 bales of 500 lbs., gross weight.

The estimated production, with comparisons, by states, follow:

STATES.	Pounds Lint. 1910.	Bales, of 500-lbs. Gross Weight. 1910.	1909.
Virginia	6,200,000	13,000	10,095
North Carolina	321,840,000	675,000	600,606
South Carolina	532,667,000	1,116,000	1,099,955
Georgia	836,150,000	1,750,000	1,805,014
Florida	27,927,000	58,000	54,011
Alabama	561,172,000	1,174,000	1,024,350
Mississippi	554,828,000	1,160,000	1,083,215
Louisiana	124,280,000	260,000	253,412
Texas	1,504,060,000	3,140,000	2,522,811
Arkansas	390,141,000	815,000	713,463
Tennessee	145,973,000	305,000	246,630
Missouri	22,973,000	48,000	45,141
Oklahoma	430,650,000	900,000	544,954
California	5,736,000	12,000	.....
UNITED STATES	5,464,597,000	11,426,000	10,004,949

Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 86, covering car balance and performance for August, 1910, says:

"Traffic conditions during August were apparently improved and the performance averages compared favorably with those for corresponding months in previous years. In many ways conditions generally during the month were quite similar to those existing in August, 1907. There were a few more idle cars this year than three years ago; there were a few more cars in shop, and there was also some increase in the number of cars owned per mile of road. The cars on their home lines averaged higher this year than three years ago, when the per cent. of loaded mileage was about the same, the difference, which was in favor of 1907, being .5 in the per cent.

"The gross earnings per mile of road, as reported by the Inter-

CAR BALANCE AND PERFORMANCE IN AUGUST, 1910.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	79,032	698,879	218,510	175,441	124,424	362,274	17,521	133,874	27,388	133,771	103,013	2,074,127
Average number of system cars on line	44,086	442,891	140,865	101,984	64,474	272,647	6,367	82,766	18,341	67,438	74,475	1,316,334
Railway-owned cars: Average foreign on line	36,565	254,735	90,587	52,462	35,196	118,026	12,184	49,689	19,223	58,040	30,177	756,884
Total cars on line	80,651	697,626	231,452	154,446	99,670	390,673	18,551	132,455	37,564	125,476	104,652	2,073,218
Excess	1,619	.....	12,942	.....	.....	28,399	1,030	.....	10,176	.....	1,639	.....
Per cent. of cars on line to total owned:												
Home	56	63	65	58	52	75	36	62	67	51	73	64
Foreign	46	37	41	30	28	33	70	37	70	43	29	36
All railways	102	100	106	88	80	108	106	99	137	94	102	100
Private cars on line	3,099	38,802	11,080	2,408	4,097	16,048	2,232	8,303	2,359	9,622	2,696	100,746
Total, all cars on line	83,750	736,428	242,532	156,854	103,767	406,721	20,783	140,758	39,923	135,100	107,348	2,173,964
Per cent. of cars in shop	5.44	6.21	9.09	7.29	10.58	6.92	5.24	9.29	5.87	6.79	5.83	7.08
No. of freight engines owned	1,152	10,300	2,890	2,988	1,985	5,886	472	2,617	782	2,540	2,168	33,780
Average cars on line per freight engine owned	73	71	84	52	52	69	44	54	51	53	50	64
Total freight-car mileage	42,507,278	508,328,406	164,698,463	115,399,849	84,909,603	293,950,703	30,727,780	91,287,364	29,318,632	118,559,382	81,109,158	1,560,796,618
Average miles per car per day	16.4	22.3	21.9	23.7	26.4	23.3	47.7	22.1	23.7	28.3	24.4	23.2
Per cent. loaded mileage	75.3	68.7	68.6	67.3	74.7	71.7	71.8	71.3	69.2	72.3	74.3	70.3
Ton-miles of freight, including company freight	474,157,760	8,375,616,429	2,621,398,369	1,900,140,647	1,199,141,464	2,354,302,229	433,212,556	1,369,844,184	362,426,861	1,804,059,701	1,084,534,667	21,978,834,867
Average ton-miles, including company freight:												
Per car-mile	11.2	16.5	16.7	16.5	14.2	14.0	14.6	15.0	12.4	15.3	13.4	15.4
Per loaded car-mile	14.8	24.0	24.4	24.5	18.0	19.8	20.4	21.2	17.9	21.1	18.0	22.0
Per car per day	183	367	367	391	376	329	740	314	293	434	327	358
Gross freight earnings	$5,624,247	$49,919,736	$15,073,654	$10,689,863	$7,485,178	$29,810,701	$3,663,025	$10,984,135	$3,117,360	$16,177,345	$7,310,929	$160,856,173
Average daily earnings: Per car owned	$2.30	$2.30	$2.23	$1.97	$1.94	$2.66	$6.74	$2.65	$3.67	$3.90	$2.61	$2.52
Per railroad car on line	2.25	2.31	2.10	2.23	2.42	2.46	6.37	2.68	2.68	4.16	2.51	2.52
All cars on line	2.17	2.19	2.01	2.20	2.33	2.36	5.69	2.52	2.52	3.86	2.44	2.40

state Commerce Commission, averaged $1,065 as against $1,067 in August, 1907. The operating ratio was 64.76 per cent. as compared with 65.06 per cent. That the car performance was better than in 1907 is indicated by the increase in the tons per loaded car and the ton miles per car per day, these two items averaging 22.0 and 358 (active cars 382), as against 20.8 and 351 (active cars 364) in August, 1907.

"The earnings per car on line were slightly lower than in 1907. Assuming that the rates were stationary, this result, taken in connection with an increased ton miles per car per day, indicates that there was a large amount of the lower class commodities handled, and that the movement was so good that the traffic did not entirely utilize the increase in efficiency and number of cars. Compared with July, 1910, the principal averages all show increases. Miles per car per day increased from 22.8 to 23.2; tons per loaded car from 21.6 to 22.0; tons miles per car per day from 323 to 358, and earnings per car on line from $2.18 per day to $2.40. The per cent. of loaded mileage increased from 68.5 in July to 70.3 in August."

The accompanying table gives car balance and performance in August, 1910.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until April 10 certain livestock tariffs, which have been issued by the Chicago & Northwestern and other roads, between the Missouri and Mississippi rivers.

The Commerce Court.

President Taft sent to the senate on Monday last the following nominations for the Court of Commerce. This court was provided for by the Mann-Elkins law of last June, and is to be opened for business within 30 days after the judges have been designated (confirmed). The nominations are: Martin A. Knapp, now chairman of the Interstate Commerce Commisison, for a term of five years; Robert W. Archibald, now United States district judge for the middle district of Pennsylvania, term of four years; William H. Hunt, now a judge of the Court of Customs Appeals, formerly United States district judge of the district of Montana, term of three years; John Emmett Carland, of South Dakota, term of two years; Julian W. Mack, now judge in the Appellate Circuit Court of the first Illinois district, term of one year.

On the same day the President nominated B. H. Meyer, of Wisconsin, and C. C. McChord, of Kentucky, to be members of the Interstate Commerce Commission, taking the place of Mr. Knapp, promoted to the Commerce Court, and Mr. Cockrell, whose term expires at the end of this month. With this change the members of the Interstate Commerce Commisison, in the order of their seniority, will be: Messrs Clements, Prouty, Lane, Clark, Harlan, Meyer and McChord.

Reparation to Cover Marine Insurance.

Wyman, Partridge & Company et al. v. Boston & Maine Railroad et al. Opinion by Commissioner Prouty:

This is a supplemental petition asking reparation. The so-called Harter Act provides that water carriers may by contract exempt themselves from liability for perils of the sea, and most bills of lading covering water-borne traffic do, in point of fact, contain such an exemption. To secure protection against loss from perils of the sea, shippers upon the Great Lakes by these lake and rail lines had been accustomed, previous to 1907, to take out marine insurance covering their individual shipments. The tariffs by which these advanced rates were established in the spring of 1907 stated that insurance against perils of the sea, while the traffic was water-borne upon the Great Lakes, would be provided by the carriers for the benefit of shippers, and the carriers claimed that the purpose of these advances was to cover the cost of this marine insurance which they, for the first time, furnished as a part of the rate.

During the season of 1907 great uncertainty prevailed among shippers as to the character and extent of the protection afforded by the insurance which the carriers professed to have effected. Wyman, Partridge & Company, who are large shippers, not being satisfied, after inquiry, that they had any adequate protection, proceeded to insure their shipments during the season of 1907, exactly as they had done during previous seasons. This petition seeks to recover by way of reparation the amounts paid by that company for this insurance.

The serious question is whether damages of this kind can be awarded. The commisison held in *Joynes* v. *P. R. R. Co.*, 17 I. C. C. Rep., 361, that it had no jurisdiction to give general damages, but could only award rate damages. Are these damages rate damages within the meaning of that case?

The commisison found that the rates prescribed by the defendants were unreasonable, for the reason and to the extent that the carrier failed to provide protection against loss from perils of the sea. Had the defendants by their tariffs and bills of lading or by some adequate form of insurance provided this protection the rates would have been reasonable. In the opinion of the commission, no such protection was provided either by the tariff or by the bills of lading or by the insurance which was effected. It was plainly the right therefore of Wyman, Partridge & Company to take out themselves marine insurance, and thereby to secure the protection to which they were entitled and which the defendants had not supplied. (19 I. C. C., 551.)

COURT NEWS.

The federal government has brought suit at Los Angeles, Cal., attacking the title of the Southern Pacific to 6,100 acres of oil lands in Kern county, which are valued, according to the complant, at $10,000,000. It is alleged that the company patented the lands with the full knowledge that they were mineral-bearing, and, therefore, could not be properly patented under the laws of the United States. The suit is said to be the first of a number that will be brought to reclaim oil lands from the Southern Pacific in Kern, Kings and Fresno counties, California.

Decision in Suit Against Anthracite Carriers.

In the United States circuit court at Philadelphia December 8, a decision was handed down in the long pending suits of the government against the anthracite coal roads, charging conspiracy in restraint of trade. The decision holds that the Temple Iron Company, owned by the coal carrying roads, is an unlawful combination, in that it violates the anti-trust law, but all the other contentions of the government are rejected. The decision was by judges Gray, Buffington and Lanning. The points here given are the only ones on which a majority of the judges agree. The prevailing opinion was by Judge Gray. Judge Buffington agrees with him, except that he holds that the railways violated the law in their 65 per cent. contract with the independent coal operators. Judge Lanning would have decided all points against the government. The suit was filed in June, 1907. Judge Gray in his opinion says:

"We are compelled to conclude that the direct evidence relied upon by the government to show that the defendants have long been parties to a general combination and conspiracy, commencing presumably in 1896 and continuing down to the filing of the petition, which stifles competition and obstructs trade and commerce among the states in anthracite coal, fails to establish that charge." The form of decree to be issued in the case of the Temple Iron Company will be taken up later by the court. The case will probably be taken to the Supreme Court of the United States.

The decision was regarded as a victory for the railways and the stocks of the roads affected rose in the stock market. Railway attorneys held that one of the most important features of the decision, from the point of view of the interpretation of the Sherman anti-trust law, was the sustaining of the position of the Reading in its ownership of a majority of the stock of the Central of New Jersey, and of the Erie in its control of the New York, Susquehanna & Western.

George F. Baer, president of the Reading said:

"The decision is a great victory for the anthracite industry of Pennsylvania. It decided that there is no combination to regulate the price, sale and production of coal. It holds the 65 per cent. purchase contracts to be legal. It affirms the legality of the purchase of the Jersey Central stock by the Reading. The only point decided against us was that there was a combination organized as the Temple Iron Company, which defeated the construction of a railway and that they violated the Sherman anti-trust act to the extent that an injunction might be granted to prevent in the future a continuing violation of the anti-trust act. Judge Lannin points out, as to the government's allegation, that the construction of the proposed railway has already been defeated and that the court cannot restrain a past violation of the act. He says 'nor does it appear, if the prayer for an injunction should be granted, the new railway would be built."

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER, 1910. (SEE ALSO ISSUE DECEMBER 9.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Atlanta, Birmingham & Atlantic	662*	$174,952	$52,790	$244,915	$28,641	$40,099	$15,114	$84,583	$9,239	$177,676	$67,239	.....	$10,000	$57,239	—$11,058
Bangor & Aroostook	599†	187,864	67,486	269,559	48,188	33,237	2,984	74,670	10,699	169,778	99,781	.....	2,525	97,256	—128
Buffalo, Rochester & Pittsburgh	573	757,362	90,132	889,593	88,848	193,829	10,490	265,959	13,343	572,469	317,124	—$151	16,000	300,973	20,058
Central of Georgia	1,915	831,424	306,521	1,244,300	165,471	186,254	31,715	350,103	38,384	771,927	472,373	6,410	45,000	433,783	—60,294
Central Vermont	411	251,593	116,704	393,707	49,854	57,141	8,016	148,746	6,448	270,205	123,502	165	10,750	112,917	34,249
Chesapeake & Ohio	1,940	2,184,234	480,095	2,768,688	350,009	542,137	42,917	793,548	61,864	1,790,476	978,212	—325	76,750	901,137	—152,545
Chicago, Indianapolis & Louisville	616	359,833	137,535	541,475	75,449	75,737	15,487	188,615	13,766	369,054	172,421	.....	22,500	149,921	—39,391
Colorado & Southern	1,248	763,442	119,063	924,331	92,250	179,181	11,500	282,389	23,686	589,006	335,325	—1,859	24,700	308,766	—41,991
Delaware & Hudson Co	819‡	1,623,260	271,324	1,948,930	155,451	235,975	21,953	584,517	41,416	1,039,312	909,618	1,729	49,922	861,425	—21,198
Denver & Rio Grande	2,553	1,691,825	501,052	2,284,437	286,696	392,929	46,896	783,634	48,822	1,558,977	725,460	—1,822	70,000	653,638	—70,512
El Paso & Southwestern Co	901§	491,015	81,080	602,817	79,743	82,618	10,727	163,729	22,892	359,709	243,108	—433	19,360	223,315	3,889
Elgin, Joliet & Eastern	808¶	708,560	7	748,277	82,400	115,876	3,795	210,131	14,644	426,846	321,431	.....	15,400	306,031	—1,592
Florida East Coast	583	117,297	65,444	215,760	46,524	40,085	4,615	82,242	9,094	182,560	33,200	.....	13,731	19,469	—6,947
Fort Worth & Denver City	454	352,640	158,618	532,850	38,397	73,117	4,987	150,486	14,735	281,722	251,128	—246	10,000	240,182	15,550
Galveston, Harrisburg & San Antonio	1,338	741,154	213,528	1,000,835	129,937	157,163	28,318	370,604	27,613	713,635	287,200	—8,579	29,200	249,421	—51,703
Grand Rapids & Indiana	587	275,562	136,286	446,106	54,649	72,669	10,950	190,549	14,279	343,096	103,010	82	23,737	79,355	—19,542
Houston & Texas Central	789	487,128	166,875	690,485	70,547	72,899	19,859	215,891	21,761	400,957	289,528	.....	17,079	272,449	45,689
Maine Central	932	511,698	264,637	823,574	138,922	106,369	7,800	285,642	21,066	559,799	263,775	2,106	35,879	230,002	11,462
Missouri, Kansas & Texas	1,736	1,198,754	456,778	1,755,715	231,057	195,309	37,227	527,759	44,976	1,036,328	719,387	1,013	22,526	697,874	—
Missouri, Kansas & Texas of Texas	1,348	847,859	386,289	1,305,877	150,474	68,228	26,254	507,442	40,118	792,516	513,361	—1,697	22,500	489,164	32,457
Mobile & Ohio	1,114	677,262	115,364	915,300	99,795	155,464	30,453	311,690	33,138	630,540	284,760	—1,569	25,460	257,731	—11,863
Nashville, Chattanooga & St. Louis	1,230	713,549	245,129	1,019,241	150,590	196,639	30,943	353,920	22,931	755,023	264,218	—598	22,287	241,333	—35,276
New York, Chicago & St. Louis	561	916,296	139,885	1,093,571	127,998	125,634	55,660	397,188	18,810	725,290	368,280	—1,504	34,500	332,277	—66,333
New York, Ontario & Western	546	613,045	104,963	743,446	114,642	117,620	10,972	290,332	15,309	548,875	194,571	—4,312	17,500	172,759	—30,666
Norfolk Southern	602	163,442	67,610	248,034	27,011	28,662	4,930	72,956	13,500	147,059	100,975	—308	6,100	94,567	—
Oregon R. R. & Nav. Co	1,489‖	963,486	391,446	1,453,742	195,207	131,840	38,906	504,788	33,209	903,950	549,792	—5,344	59,227	485,221	—233,478
Oregon Short Line	1,595a	1,430,197	470,703	2,020,132	234,071	195,663	32,301	478,934	53,812	994,781	1,025,351	—132	61,992	963,227	—226,818
St. Louis & San Francisco	4,732	2,536,169	1,005,686	3,836,057	538,782	522,850	83,560	1,252,297	95,929	2,493,418	1,342,639	.....	147,092	1,195,547	189,610
St. Louis Southwestern	769	540,480	123,297	697,506	62,532	113,147	26,401	181,577	19,761	403,418	294,088	—854	18,933	274,301	—38,940
St. Louis Southwestern of Texas	703	337,734	114,142	477,368	57,221	77,893	11,863	185,317	17,382	349,676	127,692	—163	8,333	119,196	30,063
Seaboard Air Line	3,028b	1,284,936	371,716	1,835,894	239,754	219,209	59,787	595,038	50,436	1,164,225	671,669	—1,224	65,000	605,445	18,368
Texas & Pacific	1,885	1,104,460	402,728	1,645,111	137,468	251,815	24,232	577,554	34,784	1,025,853	619,258	—1,755	50,802	566,701	—78,219
Toledo & Ohio Central	444	418,222	55,245	500,823	70,353	69,401	6,165	158,156	6,848	310,923	189,900	.....	15,856	174,044	40,867
Virginian	474c	286,345	21,016	322,382	35,382	49,893	4,860	86,840	7,138	184,113	138,269	418	13,500	125,187	105,012
West Jersey & Seashore	353	167,435	247,671	451,603	89,357	72,233	29,283	215,371	14,984	421,228	30,375	—4,791	22,773	2,811	—23,410
Wheeling & Lake Erie	457	520,238	55,675	612,580	77,159	126,468	7,516	224,165	13.367	448,675	163,905	1,196	21,125	143,976	—26,091
FOUR MONTHS OF FISCAL YEAR, 1911.															
Atlanta, Birmingham & Atlantic	662*	$634,086	$217,380	$909,589	$106,616	$155,489	$57,183	$332,783	$34,843	$686,914	$222,675	.....	$40,000	$182,675	$24,575
Bangor & Aroostook	599†	667,424	270,687	995,959	171,448	131,295	13,019	292,790	42,651	651,203	344,756	.....	8,050	336,706	—32,512
Buffalo, Rochester & Pittsburgh	573	2,783,840	427,223	3,369,846	386,509	583,773	49,331	998,637	52,636	2,070,886	1,298,960	$144	64,000	1,235,104	—2,505
Central of Georgia	1,915	2,716,634	1,227,590	4,295,951	629,419	721,794	133,037	1,304,222	153,013	2,941,485	1,354,466	27,424	179,950	1,201,940	—61,368
Central Vermont	411	826,422	464,359	1,394,142	201,227	189,140	31,140	569,210	27,000	1,017,717	376,425	3,782	42,367	337,840	—55,468
Chesapeake & Ohio	1,940	8,462,815	2,055,391	10,945,060	1,376,584	1,980,208	179,895	3,063,177	240,852	6,840,716	4,104,344	—12,001	307,000	3,785,343	—288,175
Chicago, Indianapolis & Louisville	616	1,489,906	594,204	2,260,202	289,582	289,062	68,388	737,645	56,011	1,440,688	819,514	.....	90,000	729,514	—10,702
Colorado & Southern	1,248	2,584,625	701,392	3,451,077	470,956	667,056	49,171	1,078,070	88,582	2,353,835	1,097,242	—3,495	98,800	994,947	—58,226
Delaware & Hudson Co	819‡	5,639,970	1,346,114	7,212,815	651,951	939,829	101,541	2,312,760	163,605	4,169,685	3,043,129	4,069	169,148	2,878,050	114,311
Denver & Rio Grande	2,553	6,213,738	2,202,992	8,792,196	1,175,267	1,383,047	207,345	2,801,695	192,791	5,760,145	3,032,051	7,824	280,000	2,759,875	—50,592
El Paso & Southwestern Co	901§	1,932,363	316,298	2,371,061	316,835	312,311	42,816	650,170	88,502	1,410,635	960,426	—2,431	77,440	880,555	—4,173
Elgin, Joliet & Eastern	808¶	2,787,630	37	2,960,288	452,842	574,698	16,641	878,326	53,913	1,976,420	983,868	.....	61,600	922,268	—470,886
Florida East Coast	583	425,005	262,754	799,401	176,252	157,635	18,037	331,220	32,453	715,597	83,804	.....	54,925	28,879	11,975
Fort Worth & Denver City	454	1,173,169	643,767	1,898,694	197,444	279,640	26,220	561,825	56,387	1,121,516	777,178	—5,724	40,000	731,454	—48,989
Galveston, Harrisburg & San Antonio	1,338	2,627,401	885,380	3,694,305	503,374	568,871	101,904	1,306,549	111,118	2,591,816	1,102,489	—16,641	116,800	969,048	32,000
Grand Rapids & Indiana	587	995,021	757,325	1,886,264	238,981	277,062	51,382	774,434	59,597	1,401,456	484,808	—86	97,983	386,739	—69,072
Houston & Texas Central	789	1,567,472	595,023	2,300,106	267,638	264,212	73,078	802,536	84,773	1,492,237	807,869	.....	68,317	739,552	—16,438
Maine Central	932	1,769,657	1,333,637	3,302,965	636,360	408,890	30,943	1,135,246	86,103	2,297,542	1,005,423	13,505	143,858	875,070	—227,440
Missouri, Kansas & Texas	1,736	3,933,599	1,675,863	5,982,896	894,990	893,627	145,558	1,953,128	179,124	4,066,427	1,916,469	1,302	240,127	1,677,644	—
Missouri, Kansas & Texas of Texas	1,348	2,401,192	1,323,094	3,941,304	643,090	245,305	94,029	1,628,841	132,096	2,743,361	1,197,943	4,916	90,000	1,103,027	40,815
Mobile & Ohio	1,114	2,574,288	488,265	3,549,101	424,379	610,440	136,332	1,232,196	127,478	2,530,825	1,018,276	7,788	98,240	912,248	—53,112
Nashville, Chattanooga & St. Louis	1,230	2,614,239	1,031,241	3,873,282	575,804	728,792	141,758	1,388,199	97,726	2,932,279	941,003	—2,302	89,148	849,553	—64,652
New York, Chicago & St. Louis	561	3,096,249	645,628	3,876,975	456,318	507,755	211,035	1,477,989	64,747	2,717,844	1,159,131	—5,167	138,000	1,015,964	—215,560
New York, Ontario & Western	546	2,456,796	884,970	3,482,661	429,788	480,608	49,031	1,177,135	66,381	2,202,943	1,279,718	—12,735	70,000	1,196,983	—213,579
Norfolk Southern	602	576,349	289,930	940,039	114,267	111,806	20,364	280,608	53,005	580,050	359,989	4,491	24,400	340,080	—
Oregon R. R. & Nav. Co	1,489‖	3,651,348	1,618,934	5,604,182	812,363	521,486	124,021	1,845,955	131,454	3,435,279	2,168,903	3,982	236,909	1,935,976	—754,247
Oregon Short Line	1,595a	5,287,740	1,975,845	7,675,630	1,107,017	731,748	127,574	1,747,476	174,528	3,888,343	3,787,287	1,142	247,816	3,540,613	—626,724
St. Louis & San Francisco	4,732	9,105,110	4,037,617	14,095,226	1,962,152	1,934,816	316,749	4,779,196	374,219	9,367,132	4,728,094	.....	557,688	4,170,406	264,305
St. Louis Southwestern	769	1,961,227	479,917	2,549,599	264,452	418,042	105,597	653,681	84,838	1,526,610	1,022,989	—4,242	75,733	943,014	—98,355
St. Louis Southwestern of Texas	703	1,051,184	389,667	1,529,420	343,506	279,676	42,165	626,010	62,721	1,354,078	175,342	—899	33,333	141,110	—8,149
Seaboard Air Line	3,028b	4,319,953	1,499,712	6,494,846	966,404	886,473	233,778	2,202,844	190,700	4,480,199	2,014,647	—7,768	260,000	1,746,879	—3,460
Texas & Pacific	1,885	3,565,793	1,471,295	5,463,071	709,559	1,087,337	86,234	2,097,827	139,623	4,120,580	1,342,491	—5,095	164,727	1,172,669	—263,943
Toledo & Ohio Central	444	1,610,134	264,491	1,985,880	253,581	247,100	27,817	585,236	32,236	1,145,970	839,910	.....	62,715	777,195	228,911
Virginian	474c	1,020,536	99,415	1,157,310	129,692	184,208	22,426	298,552	30,179	665,057	492,253	2,660	53,500	441,413	324,943
West Jersey & Seashore	353	677,314	1,974,072	2,813,264	374,287	289,650	86,788	943,487	44,914	1,739,126	1,074,138	—30,810	91,091	952,237	20,955
Wheeling & Lake Erie	457	2,162,369	245,411	2,580,588	328,673	446,870	35,649	847,889	53,907	1,712,988	867,600	11,132	85,806	792,926	81,904

*Mileage operated on October 31, 1909—641 miles; † 530 miles; ‡ 819 miles; § 867 miles; ¶ 770 miles; ‖ 1,327 miles; *a* 1,509 miles; *b* 2,987 miles; *c* 444 miles. — indicates Deficits, Losses and Decreases.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

George L. Potter, third vice-president of the Baltimore & Ohio, with office at Baltimore, Md, has resigned.

W. L. Mattoon, assistant engineer of the Hocking Valley at Columbus, Ohio, has been appointed real estate agent in charge of taxes, with office at Columbus.

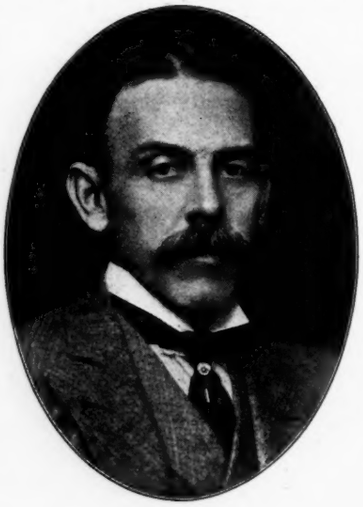
Carl Nyquist, chief clerk to the vice-president, secretary and treasurer of the Chicago, Rock Island & Pacific at Chicago, has been appointed assistant secretary, with office at Chicago.

J. N. Tittemore, formerly freight traffic manager of the Iowa Central and the Minneapolis & St. Louis, and during part of 1909 general traffic manager of the Pere Marquette, has been appointed assistant to the president of the St. Paul & Des Moines, with office at Des Moines, Iowa.

J. W. Kendrick, vice-president in charge of operation of the Atchison, Topeka & Santa Fe, with office at Chicago, has been granted a six-month's leave of absence, during which time he will take a trip around the world. W. B. Storey, vice-president in charge of construction, will assume Mr. Kendrick's duties temporarily.

Daniel Crombie, whose appointment as assistant to first vice-president of the Grand Trunk, at Montreal, Que., has been announced in these columns, was born May 13, 1864, at Hamilton, Ont. He was educated in the public schools and began railway work in 1882 as a telegraph operator on the Grand Trunk, and was later agent and train despatcher. In 1894 he was appointed car service agent of the Flint & Pere Marquette, now a part of the Pere Marquette, and four years later was made superintendent of car service on the same road. In 1900 he was appointed superintendent of transportation of the Pere Marquette, at Detroit, Mich., and three years later resigned from that position to go into other business. Mr. Crombie returned to railway work in February, 1907, when he became master of transportation of the Grand Trunk, at London, Ont., and in October of the same year he was appointed assistant to the general transportation manager at Montreal, which position he held at the time of his recent appointment as assistant to first vice-president.

Henry W. Miller, assistant to first vice-president, A. B. Andrews of the Southern Railway, at Raleigh, N. C., who was recently appointed assistant to the president with office at Atlanta, Ga., as previously announced in these columns, has been in the service of the Southern Railway and its predecessor, the Richmond & Danville, for 25 years. For several years past Mr. Miller has been engaged in looking after the interests of the Southern Railway and affiliated companies in all matters relating to taxes, and this work he will continue in his new position. He was born at Raleigh, N. C., August 8, 1868, and was educated in the public and private schools of his native city. In October, 1885, he entered the service of the Richmond & Danville as loading clerk at the Raleigh freight house and as relief telegraph operator. He was advanced to billing clerk and then chief clerk at this station, and later became rate clerk in the division freight office. Leaving the traffic department he became chief clerk and secretary to the third vice-president of the same road, becoming secretary to the second vice-president on the organization of the Southern Railway Company, and later secretary to the first vice-president. In December, 1901, he was appointed assistant to the first vice-president. He is also president of the Durham, N. C., Union Station Company and secretary of a number of small lines affiliated with the Southern Railway.



H. W. Miller

Operating Officers.

E. B. Eppes, general manager of the Gainesville Midland, at Gainesville, Ga., has resigned.

O. H. McCarty has been appointed superintendent of the St. Louis & San Francisco, with office at Sapulpa, Okla., succeeding H. F. Clark, resigned.

G. D. Wright, trainmaster of the Southern Pacific at Oakland Pier, Cal., has been appointed an assistant superintendent, with office at Stockton, Cal.

George W. Berry, superintendent of the Illinois Central at Ft. Dodge, Iowa, has been appointed superintendent, with office at Freeport, Ill., succeeding Eugene Dailey, resigned.

F. M. Barker, trainmaster of the Lehigh Valley at Auburn, N. Y., has been appointed inspector of transportation, with office at South Bethlehem, Pa. C. N. Page succeeds Mr. Barker.

H. A. Oldham, general yardmaster of the St. Louis & San Francisco at Birmingham, Ala., has been appointed trainmaster of terminals, with office at Birmingham, succeeding F. J. Lee, resigned.

J. Berlingett, general manager of the St. Joseph & Grand Island, has been appointed vice-president and general manager of the Virginian Railway, with office at Norfolk, Va., effective January 1.

H. G. Ganson has been appointed superintendent of sleeping, dining and parlor cars and of news service on the British Columbia division of the Canadian Pacific, with office at Vancouver, B. C., succeeding A. W. Porter, transferred.

H. D. Pollard, whose resignation as superintendent of the Central of Georgia, was recently announced in these columns, has been appointed superintendent, in charge of the Sorocabana division of the Brazil Railway, with office at Sao Paulo, Brazil.

G. O. Perkins, superintendent of telegraph of the National Railways of Mexico at Mexico City, has been appointed superintendent of telegraph of the Chicago Great Western, with office at Chicago, succeeding A. T. Hollenbeck, assigned to other duties.

C. M. Andrews, superintendent of the Natchez division of the St. Louis, Iron Mountain & Southern at Ferriday, La., has had his jurisdiction extended over the Arkansas Southwestern division, succeeding J. J. Kress, resigned to engage in other business.

J. C. Morris has been appointed trainmaster of the Cincinnati division of the Erie Railroad, with office at Marion, Ohio, succeeding W. G. Baldwin, whose appointment as superintendent of the Chicago & Erie division has already been announced in these columns.

W. H. Blake has been appointed superintendent, in charge of the operating department, of the Tampa Northern, with office at Tampa, Fla. Captain W. B. Denham, general manager at Tampa, has resigned to go to another company, and his former position has been abolished.

A. W. Thompson, chief engineer of the Baltimore & Ohio System, at Baltimore, Md., has been appointed general manager, with office at Baltimore. A portrait of Mr. Thompson and a sketch of his railway life was published in the *Railway Age Gazette* of April 15, 1910, page 1013.

J. P. Atkins, car service agent of the Pere Marquette, with office at Detroit, Mich., having resigned to accept service elsewhere, that office has been abolished, and H. O. Halsted, whose appointment as superintendent of transportation has been announced in these columns, will assume the duties of the car service agent. W. A. Carruthers, yardmaster at Detroit, has been appointed trainmaster, with office at Detroit, succeeding E. E. Cain, resigned to accept service elsewhere.

Sidney S. Stone, who was recently appointed acting superintendent of the Morris & Essex division of the Delaware, Lackawanna & Western, with office at Hoboken, N. J., was born May 29, 1875, at Hawley, Pa. He was educated in the public schools and began railway work in 1890 with the Erie & Wyoming Valley, now a part of the Erie Railroad. From 1890 to 1900 he was an operator and train despatcher on the Erie Railroad and then went to the Delaware, Lackawanna & Western as train despatcher, remaining in that position until 1905, when he was appointed chief train despatcher. In 1908 he was appointed assistant superintendent of the Morris & Essex division, which position he held at the time of his recent appointment as acting superintendent of that division.

Traffic Officers.

A. D. Hagaman has been appointed a commercial agent of the Southern Pacific, with office at San Diego, Cal.

C. R. Strickler has been appointed agent of the Lackawanna Line, with office at Des Moines, Iowa, a new agency.

E. C. Hoskins has been appointed a soliciting freight agent of the St. Louis Southwestern, with office at Dallas, Tex.

George W. De Lanoy has been appointed traffic manager of the Texas City Steamship Company, with office at New York.

J. H. Davenport has been appointed a traveling freight agent of the Atlantic Coast Line, with office at St. Louis, Mo.

C. C. Harvey, soliciting freight agent of the Mobile & Ohio, with office at Kansas City, Mo., has resigned to engage in other business.

C. W. Minch has been appointed a traveling passenger agent of the Missouri Pacific, with office at St. Louis, Mo., succeeding Daniel Delaney, resigned.

W. G. Trufant, traveling freight agent of the International & Great Northern at New York, N. Y., has been appointed commercial agent, with office in New York.

W. R. Barnet has been appointed assistant general passenger agent of the New York Central & Hudson River, the West Shore and the Boston & Albany, with office at New York.

W. H. Phillips has been appointed a traveling freight agent of the Pittsburgh, Cincinnati, Chicago & St. Louis, with office at Richmond, Ind., succeeding J. E. Collins, promoted.

J. B. Gibson, traveling freight agent of the St. Louis & San Francisco at Houston, Tex., has been appointed commercial agent of the Houston East & West Texas, with offices at Houston, succeeding H. St. John Waggaman, resigned.

F. E. Landmeier, district passenger agent of the Chesapeake & Ohio of Indiana at Chicago, has been appointed a traveling passenger agent of the Chesapeake & Ohio, with office at Kansas City, Mo. This is a new office and the appointment will go into effect January 1.

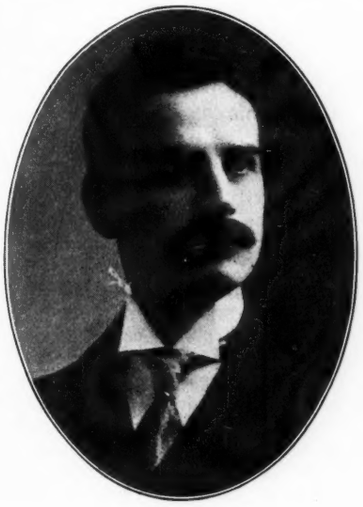
Wm. Fitzgerald, Jr., has been appointed an assistant general freight agent of the Hocking Valley, with office at Chicago. H. M. Hall has been appointed a general agent at Chicago; and A. H. Heckendorf has been appointed a commercial agent, with office at Milwaukee, Wis.

Ralph S. Stubbs, assistant general freight and passenger agent of the Southern Pacific, at Tucson, Ariz., has been appointed general eastern freight agent of the Southern Pacific, and general freight agent of the Atlantic Steamship Lines of the Southern Pacific, with office at New York, succeeding L. J. Spence, promoted.

Owen Durham, Florida passenger agent of the Illinois Central, at Jacksonville, Fla., has been appointed a traveling passenger agent of the Illinois Central and the Yazoo & Mississippi Valley, with office at Memphis, Tenn., succeeding H. C. Cantwell, who succeeds Mr. Durham, as Florida passenger agent of the Illinois Central.

George H. Leggett has been appointed a general agent of the Wheeling & Lake Erie, with office at Canton, Ohio, succeeding H. S. Bradley, resigned to accept service with another company. Mr. Leggett will have jurisdiction over Canton and stations on the Carrollton division. Matters relating to freight traffic on the Toledo division (Massillon, Ohio, to Curtice), formerly under the jurisdiction of the general agent at Canton, will be handled by the traffic department at Cleveland. R. F. Smith has been appointed a traveling agent, with office in Cleveland.

Lewis J. Spence, whose appointment as assistant director of traffic of the Union Pacific and Southern Pacific has been announced in these columns, was born September 16, 1868, at Wilmington, Del. He received a public school education and began railway work in October, 1885, as a stenographer in the office of Edwin Hawley, then general eastern agent of the Southern Pacific at New York. He was later appointed chief clerk to the assistant general traffic manager, and from 1896 to 1902 was Eastern freight agent; he was then appointed general Eastern freight agent, and in 1906 was made also general freight agent of the Atlantic Steamship Lines of the Southern Pacific. His appointment as assistant director of traffic of the Union Pacific and the Southern Pacific, with office at Chicago, will become effective January 1, 1911.



Lewis J. Spence

Engineering and Rolling Stock Officers.

F. T. Slayton has been appointed superintendent of motive power of the Virginian Railway, with office at Princeton, W. Va., succeeding L. B. Rhodes, resigned.

F. W. Peterson, master mechanic of the Chicago & North Western, at Green Bay, Wis., has been appointed master mechanic of the Wisconsin division, with office at Chicago. Ernest Becker succeeds Mr. Peterson.

Willard Kells, whose appointment as assistant to the general superintendent of motive power of the Atlantic Coast Line, with office at Wilmington, N C., has been announced in these columns, was born February 4, 1868, at Dennison, Ohio. He received his education in the grammar school and at the Cleveland high school, and began railway work March 1, 1888, as machinist's apprentice on the Erie Railroad at Susquehanna, Pa. Four years later he was appointed gang foreman, and in October of the following year was made general foreman, at Meadville. He was appointed master mechanic January 6, 1896, at Cleveland, Ohio, and was later transferred to Huntington, Ind., and then to Meadville. In April, 1903, he left the service of the Erie to become assistant master car builder, Union Tank Line, with office at New York, and the following month was appointed master mechanic of the Pennsylvania & Auburn division of the Lehigh Valley, at Sayre, Pa. In July, 1906, he was transferred to Buffalo as master mechanic of the Buffalo division, which position he held at the time of his recent appointment as assistant

Willard Kells

to general superintendent of motive power of the Atlantic Coast Line. Mr. Kells for the past two years has been also third vice-president of the Central Railway Club.

Edward J. Snell, whose appointment as master mechanic of the New York Central & Hudson River, with office at Corning, N. Y., has been announced in these columns was born Jan. 3, 1875, in England. Mr. Snell was educated in the common schools and took a two-year course in a mechanical drawing school. He began railway work in April 1888, with the New York Central & Hudson River as boilermaker's apprentice and three years later was made a machine shop apprentice. From 1897 to 1903 he was a locomotive fireman. He was appointed roundhouse foreman in 1903, which position he held at the time of his recent appointment as master mechanic.

Alfred E. Calkins, who was recently appointed assistant to superintendent of rolling stock of the New York Central & Hudson River, with office at New York, as previously announced in these columns, was born February 13, 1873, at Jersey City, N. J. He received his education in the high schools and at business college. Mr. Calkins began railway work January 7, 1892, in the operating department of the New York Central & Hudson River, at Utica, N. Y. The following May he was transferred to the general office of the rolling stock department, and in February, 1898, he was appointed chief clerk at the East Rochester car shop. In September of the following year he returned to the general office of the rolling stock department, and in September, 1901, he was appointed chief clerk to the superintendent of rolling stock at New York, which position he held at the time of his recent appointment as assistant to superintendent of rolling stock.

Don Juan Whittemore, chief engineer of the Chicago, Milwaukee & St. Paul, and of the Chicago, Milwaukee & Puget Sound lines east of Butte, with office at Chicago, having been with the St. Paul and its predecessors continuously for 57 years, has resigned from that office and has been appointed consulting engineer, an honorary position created in recognition of the high character and unusual length of his service. Mr. Whittemore was born at Milton, Vt., in 1830. He was educated at the Bakersfield Academy, Vermont, and began railway work in 1847 with an engineering corps on the Vermont & Canada, now part of the Central Vermont. Two years later he was appointed assistant to the chief engineer in charge of construction between Swanton, Vt., and Rouses Point, N. Y., and then went with the Great Western of Canada, where he remained until 1852. He was also for a time with the Central Ohio when that road was building from Zanesville, Ohio, to Wheeling, W. Va. He was made assistant to the chief engineer of the La Crosse & Milwaukee, now part of the Chicago, Milwaukee & St. Paul in 1853, and for three years from 1860 was chief assistant to the chief engineer. From 1857 to 1859 he was also chief engineer and director of the Southern Minnesota (land grant) Railroad, and for two years from 1858 chief assistant engineer on the Ferrocarril Del Oeste in Cuba. When the La Crosse & Milwaukee was merged with the Chicago, Milwaukee & St. Paul in 1863, he was appointed chief engineer, which position he held continuously until his resignation on December 6. Since March, 1906, he has been chief engineer also of the Chicago, Milwaukee & Puget Sound. He is a member of the American Society of Civil Engineers, of the American Society of Mechanical Engineers and of the Institution of Civil Engineers of Great Britain. He received the degree of Doctor of Laws from the University of Wisconsin and of Civil Engineering from the University of Vermont.

D. J. Whittemore

Thomas Henry Malican, whose appointment as master mechanic of the Lehigh Valley, at Hazleton, Pa., has been announced in these columns, was born March 15, 1864, in Ireland. He was educated in the public and parochial schools and began railway work in July, 1876, as call boy on the New York Central & Hudson River, at Rochester, N. Y. From April, 1878, to November, 1882, he was machinist's apprentice at the East Buffalo shops, and was then machinist on general work until January, 1893, when he was appointed assistant roundhouse foreman, remaining in that position about three months. From April, 1893, to December, 1899, he was successively motion work, erecting shop and machine shop foreman, at Depew, and from January, 1900, to March of the following year he was machine shop foreman at West Albany. He was then transferred to East Rochester as roundhouse foreman, remaining in that position from March, 1901, to April, 1905, when he resigned on account of ill health. In May, 1905, he went to the Lehigh Valley as gang foreman and two months later was promoted to general foreman at Manchester. In January, 1906, he was promoted to general foreman at East Buffalo, and in November, 1908, he was appointed general foreman at the Sayre, Pa., roundhouse, which position he held at the time of his recent appointment as master mechanic of the Mahanoy & Hazleton division of the Lehigh Valley.

OBITUARY.

John F. Hennessey, special claim agent of the Vandalia, with office at Indianapolis, Ind., died in Indianapolis on December 6.

John Rogers Maxwell, chairman of the executive committee of the Central Railroad of New Jersey, died at his home in Brooklyn, N. Y., on December 11. Mr. Maxwell was a member of the board of managers of the Delaware, Lackawanna & Western, a director of the Durango Central and the Lehigh & Hudson River, and was connected with other railways and with many industrial corporations, including the Atlas Portland Cement Company, the North American Portland Cement Company, the American Cotton Oil Company, the N. K. Fairbank Company, Manning, Maxwell & Moore, the Lehigh & Wilkesbarre Coal Company, the Mexican Mining & Smelting Company, and the Durango Delevopment Company. He was formerly a member of the firm of Maxwell & Graves, bankers. In 1881 this firm had a part, with Austin Corbin, in the purchase of the Long Island Railroad, and Mr. Maxwell was vice-president of the road.

Edward V. W. Rossiter, a vice-president of the New York Central & Hudson River, died at his home in Flushing, N. Y., December 11, after an illness of several months. Mr. Rossiter was born July 13, 1844, at St. Louis, Mo., and for over 50 years had been connected with lines now forming part of the New York Central system. He began railway work in September, 1859, as clerk to the president of the Hudson River Railroad, and the following year was appointed a clerk in the treasurer's office of the same company. He was appointed cashier of the New York & Harlem in 1867. Ten years later he was made treasurer of the same road, and was chosen vice-president in January, 1901. In June, 1883, he was appointed treasurer of the New York Central & Hudson River, and since November, 1900, had been vice-president in charge of the financial department. In June, 1904, he was elected also vice-president of the Lake Shore & Michigan Southern and the Michigan Central, and the following January was elected also vice-president of the Cleveland, Cincinnati, Chicago & St. Louis. Mr. Rossiter was a member of the New York Chamber of Commerce, the New England Society, the Union League, and the Transportation Club, in New York.

Mr. Rossiter was closely connected, as executor and otherwise, with the administration of the Vanderbilt estate, and was generally credited with knowing more about the Vanderbilt family fortunes and the Vanderbilt railways than any other man. Until his last illness he invariably represented the New York Central companies in negotiations with bankers, having thus handled the flotation of many hundreds of million dollars' worth of securities. Personally, Mr. Rossiter was known for his fine, old-fashioned courtesy, with which was combined in a marked degree a direct and exact manner of speaking.

Railway Construction.

ALGOMA CENTRAL & HUDSON BAY.—Work is now under way by the O'Boyle Brothers Construction Co., Ltd., Sault Ste. Marie, Ont., from Hawk Lake Junction to Hobon, 30.50 miles, and from Magpie Junction to Magpie mine, 9.5 miles. The company has finished work on about 50 miles, and surveys are under way for 110 miles.

ANGELINA & NECHES RIVER.—This road is now in operation for passenger and freight traffic from Keltys, Texas, eastward to Naclina, 19.9 miles.

ARIZONA ROADS.—H. H. Stone, Phoenix, Ariz., is said to be back of a project to build an electric line from Phoenix, east to Mesa City, about 18 miles.

ATLANTIC COAST LINE.—See Winston-Salem Southbound.

BOSTON & MAINE.—An officer writes that work is now actively under way on the electrification of the Hoosac tunnel, and that it is expected to have this improvement finished during the summer of 1911. The work at Lynn includes provision for four tracks. (December 9, p. 1133.)

BUFFALO CREEK & GAULEY.—This company has projected an extension from Widen, W. Va., to Huttonsville, 90 miles.

CAROLINA, CLINCHFIELD & OHIO.—See Elkhorn Southern.

CINCINNATI UNION DEPOT & TERMINAL COMPANY.—This company has accepted the ordinance passed last summer for the proposed station to be built between Third and Pearl streets in Cincinnati. The building is to be 200 ft. x 400 ft., on the north side of Third street, with train sheds, 309 ft. wide, to the south side of Pearl street The plan calls for 14 through tracks. A large office building is to be built over the station for the various railways interested and in addition a separate building is to be put up to accommodate the electric interurban railways. The franchise provides that within 21 months the company must have $2,000,000 of assets, and within five years the station and terminals must be completed. A. S. White, president, and John E. Bleekman, vice-president, Cincinnati.

CROSBYTON-SOUTH PLAINS.—Surveys are being made for an extension from Crosbyton, Tex., to Spur, 35 miles. John A. Knox, chief engineer, Lubbock. (Oct. 21, p. 759.)

DURHAM & CHARLOTTE.—This company has bought the Raleigh & Western and is making surveys for an extension from Colon, N. C., to Sanford, three miles.

ELKHORN SOUTHERN.—This line, which has been leased to the Carolina, Clinchfield & Ohio, is making surveys for an extension from Elkhorn City, Ky., to Laurel Branch Junction, 33 miles.

FLORIDA EAST COAST.—An officer writes that work is under way by the Kissimmee Construction Company, Jacksonville, Fla., from Maytown, Volusia county, to Lake Okeechobee, 125 miles, and work is under way by the company's men from Night's Key to Key West, 40 miles.

GRAND TRUNK PACIFIC.—An officer writes that work is under way as follows: From Mile 25 to Prince Albert, Sask., 87 miles; Mile 48 to Regina, 48 miles; Oban to Battleford, 48 miles; Regina, southeast towards the international boundary, 90 miles; Regina to Moose Jaw, 45 miles; Prairie Creek, Alb., to Copper river, Alaska, 665 miles; Red Deer river, Alb., to Calgary, and from Bickerdike, southwesterly 59 miles. Surveys are now being made on the section from Mile 90 to the international boundary, 52 miles.

This company will complete about 437 miles of new main track on the eastern section during 1910. Work is now under way between Moncton, N. B., and Winnipeg, Man., on 807 miles.

GULF, COLORADO & SANTA FE.—Work is now under way from the Colorado river to Brady, Tex., on 53 miles, and from Whiteland to Egen, 21 miles. The contractors are Levy & Owens, Galveston. The C. H. Sharpe Contracting Company, Kansas City, Mo., and Morey & Faulhaber, St. Louis. Part of the bridge work is being carried out by the Union Bridge & Construction Company, Kansas City.

KANSAS CITY, MEXICO & ORIENT.—An officer writes that work is now under way by Roach & Stansell, Memphis, Tenn., on the section from Mertzon, Tex., to Fort Stockton, 130 miles; also on the Del Rio branch between San Angelo and Del Rio, on 160 miles. (July 15, p. 142.)

LAKE SUPERIOR & ISHPEMING.—Work is now under way by Gus Freden, Norway, Mich., on an extension from North Lake, Mich., to Barnes mine, 2.5 miles.

NOOKSACK VALLEY TRACTION.—This company, with headquarters at Bellingham, Wash., is said to have issued bonds, the proceeds of which are to be used for building a 60-mile line in Whatcom county.

NORTHWESTERN PACIFIC.—Work is now under way by Willett & Burr, and the Utah Construction Company, both of San Francisco, Cal., between Willits and Shively, 46.9 miles. A line has been projected between Healdsburg and Christine, 62 miles, of which 51.5 miles has been surveyed.

NORFOLK & WESTERN.—See Winston-Salem Southbound.

OREGON RAILROAD & NAVIGATION COMPANY.—Surveys have been made for a cut-off from Coyote, Ore., to Stanfield, 24.1 miles. Work is now under way on a line from Maegley Junction, Ore., to Troutdale, 14.86 miles. Twohy Brothers, Portland, are the contractors.

The Oregon & Washington is building from Mocks Bottom, Ore., to North Portland Junction, 1.7 miles, including a tunnel of 5,430 ft. Robert Wakefield and the Pacific Bridge Company have contracts for the work.

Work is now under way on the Oregon Eastern, from Natron, Ore., southeast to Klamath Falls, 142.6 miles.

OREGON & WASHINGTON.—See Oregon Railroad & Navigation Company.

OREGON EASTERN.—See Oregon Railroad & Navigation Company.

PELHAM & HAVANA.—This company has projected an extension from Cairo, Ga., to Pelham, 20 miles.

PORT BOLIVAR IRON ORE.—This company proposes to build from Longview, Tex., northward to iron ore fields in Cass county. Engineers have been at work for some time locating the line and construction work is to be started at once. L. P. Featherstone, president; W. D. Myers, vice-president; W. C. Brothers, treasurer, Galveston, and L. L. Featherstone, secretary Beaumont.

RALEIGH & WESTERN.—See Durham & Charlotte.

SHREVEPORT & MEMPHIS.—Incorporated in Louisiana to build from Eldorado, Ark., southwest via Homer, La., to Minden, 45 miles. The intention is to extend the line eventually on the south to Shreveport and on the north to Memphis, Tenn. Surveys are said to be made between Eldorado and Minden. C. O. Ferguson and A. R. Johnson, Homer, are interested.

TEXAS ROADS.—A company is being organized to carry out an old project to build a line from San Antonio, Texas, to a point in the lower Rio Grande valley, about 260 miles. Residents of San Antonio are said to be back of the project.

UTAH & GRAND CANYON.—Incorporated in Utah with $150,000 capital, to build from Lund, Iron county, Utah, south to St. George, Washington county, 85 miles; also, to build from Marysvale south to Panguitch, 55 miles. F. A. Dudley, president, Niagara Falls, N. Y.; F. H. Reed, New York, and F. Harris, Chicago, vice-presidents; R. B. Merchant, secretary and treasurer, New York; S. L. Seldon and T. C. Gillespie, New York, and V. E. Huntsacker, Salt Lake City, are directors.

WESTERN ALLEGHENY.—An officer writes that the company has projected an extension of 14 miles, from Dewey (Bradys Bend), Pa., to Reidsburg, in Clarion county, and another extension from a point 12 miles from Dewey to a point on the Allegheny river north of Masgrove, where connection is to be made with the Pittsburg, Shawmut & Northern.

WINSTON-SALEM SOUTHBOUND.—An officer writes that this line, which was built jointly by the Norfolk & Western and the Atlantic Coast Line, from Winston-Salem, N. C., south to Wadesboro, 89 miles, has been completed, but not fully ballasted, the last spike having been driven on November 23. The first train was run over the entire line on November 24. Regular passenger service from Winston-Salem, south to Whitney, 49 miles, was established December 15, and regular service over the entire line will be started about January 1. (December 9, p. 1130.)

Railway Financial News.

Chicago, Rock Island & Pacific.—Speyer & Co. have purchased from the company $3,750,000 first and refunding mortgage 4 per cent. bonds, due 1934, issued for improvements and other corporate purposes, and have privately resold the entire amount.

Chicago & North Western.—The entire $15,000,000 general mortgage 4 per cent. bonds recently purchased from the railway by Kuhn, Loeb & Co., have been privately sold.

Duluth, Winnipeg & Pacific.—The London Stock Exchange has listed £950,000 ($4,750,000) first mortgage 4 per cent. debenture stock.

Interoceanic of Mexico.—The returns for the Interoceanic of Mexico, which is leased to the National Railways of Mexico, and whose figures are not given in our table of monthly earnings and expenses of railways, show the company earned $2,860,196 gross in the first four months of the current fiscal year, comparing with $2,669,020 gross in the corresponding period last year. Operating expenses amounted to $1,798,636 in the current year, comparing with $1,814,983 last year. Net earnings were $1,061,560 in the current year, an increase of 24 per cent. over the corresponding period last year.

Missouri, Kansas & Texas.—This company is advertising in Texas papers its intention to apply to the legislature for the enactment of a special law giving it authority to take over and operate as a part of its Texas system of railway the Texas Central. Several weeks ago the Missouri, Kansas & Texas informally asked the railway commission for authority to lease the Texas Central for five years. A majority of the members of the commission, including O. B. Colquitt, governor-elect, objected to any consolidation of the two roads, and even to a lease. Mr. Colquitt's position in the matter is important since he will have the veto, even should a bill be passed by the legislature at the coming session which convenes in January. The Texas Central was bought by the Missouri, Kansas & Texas a few months ago. It is still being operated as a separate independent property.

National Railways of Mexico.—The directors have adopted the suggestion made by the vice-chairman at the annual meeting that additional dividends of 1 per cent. be paid from earnings for the fiscal year ended June 30, 1910, on the first preferred stock. There was, therefore, paid from earnings for the fiscal year the full 4 per cent. on the first preferred stock.

The returns for the National Railways of Mexico (not shown in our table of monthly earnings and expenses as sent to the Interstate Commerce Commission) show that the company had gross earnings for the first four months of the present fiscal year of $21,325,339. This is an increase of 17 per cent. over the corresponding period of last year. Operating expenses in the current four months totaled $12,518,621, an increase of 10 per cent. over 1910; and net earnings amounted to $8,806,718 this year, as compared with $6,917,937. This is an increase in the current year of 27 per cent.

St. Louis Southwestern.—A semi-annual dividend of 2 per cent. has been declared on the $19,893,650 5 per cent. non-cumulative preferred stock, payable January 15. This compares with 2½ per cent. paid in July and January, 1910, and 2 per cent. in July, 1909. A statement issued by the company after the annual meeting says that the gross earnings are satisfactory but expenses have increased disproportionately.

Seaboard Air Line.—The syndicate headed by Blair & Co., New York, which last year underwrote the $18,000,000 40-year adjustment income 5 per cent. bonds of the Seaboard Air Line, was dissolved on December 15, all of the bonds having been sold.

The second semi-annual 2½ per cent. interest coupon on the outstanding $24,979,500 adjustment income bonds is to be paid in full. This makes the full 5 per cent. paid on these income bonds for the year in which they have been outstanding. Of these income bonds $25,000,000 was authorized, of which $6,979,500 were issued to retire general mortgage bonds and $18,000,000 were underwritten by the Blair syndicate at 70, less commission.

Late News.

The items in this column were received after the classified departments were closed.

The Clarion & East Brady Electric has ordered 1,500 tons of rails from the Carnegie Steel Company.

William Cleburne, who surveyed a part of the original route for the Union Pacific died December 14, in Newport, Ky., aged 86.

The Wabash-Pittsburgh Terminal will be in the market shortly for 2,000 coal cars. Receiver's certificates to pay for them have been authorized.

The Nashville, Chattanooga & St. Louis has ordered 10,000 tons of rails and not 24,000 tons of rail as was incorrectly stated in our issue of December 9.

H. K. McEvoy has been appointed general agent, passenger department of the Chicago & Alton, with office at Chicago, succeeding C. R. Davidson, assistant general passenger agent, resigned.

The Massachusetts Railroad Commission has approved the issue of $10,663,700 new common stock by the Boston & Maine at $110 per share, proceeds to be used for additions to equipment, permanent improvements and abolishing grade crossings.

Nearly 25 banks in the districts of Minnesota and the Dakotas, where farmers are holding back grain in expectation of higher prices in the spring, are now refusing to make new loans on that basis, being actuated by a desire to avoid congestion on the railways.

The supreme court of Georgia has handed down an opinion affirming the decision of the master, that the full 5 per cent. interest on the second and third income bonds of the Central of Georgia was payable out of the earnings of the company for the fiscal year ended June 30, 1907. It is the understanding that inasmuch as no constitutional questions are involved, this opinion will end the long drawn out litigation between the income bondholders and the railway company.

Judge Noyes in the United States Circuit Court has signed an order in the suit of W. O. Johnson against Archibald S. White for $25,000 claimed for professional services in the sale of the Indiana Southern Railroad Company to the Illinois Central Railway Company to the effect that the complainant must file an amended complaint. The complainant alleges that he was engaged by White in 1903 or 1904 to effect a sale of the Indiana Southern to the Illinois Central, and that he brought about the deal whereby the Illinois Central Railway took over the Indiana Southern Railroad.

The union telegraphers have asked the Philadelphia & Reading to reinstate two men who were members of grievance committees, and who, it is alleged, were dismissed because of their activity in the union. Besides the demand for reinstatement of the discharged men, the union asks for seniority rights, pass privileges, and equalization of pay in certain classes of work. The railway company has strung telephone lines to all its offices on the New York and Philadelphia divisions. In the event of the men leaving their stations, competent persons will report the movement of trains by telephone. No trouble is expected along the Schuylkill valley because here few of the telegraphers belong to the union.

In the case of Henry A. Klyce Co. v. Illinois Central et al., the Interstate Commerce Commission in an opinion by Commissioner Clark found that when bankruptcy proceedings discontinued operation of a milling plant that was using a transit privilege, there were on hand large numbers of inbound expense bills and practically no corresponding tonnage of grain or grain products entitled to transit rates, it is held that such old expense bills were worthless for reshipping purposes in connection with tonnage that moved into the plant after complainant had resumed business at the same plant, first as a lessee, and later as a corporation. Complainant is entitled to use for transit purposes inbound expense bills representing grain moved into the plant subsequent to resumption of business under lease, and to reparation on certain shipments in connection with which confusion as to the proper manner of surrender of expense bills was contributed to by both defendant and complainant. (19 I. C. C., 567.)

Supply Trade Section.

S. L. Kemps has been elected secretary of the T. H. Symington Co., Baltimore, Md.

Of the locomotives recently ordered by the New York Central, 85 will be fitted with superheaters of the Locomotive Superheater Company, New York.

It is understood that Argentina has begun to standardize the couplings on all the freight cars in use on its railways, which will involve an expenditure of $2,500,000.

The Pittsburgh Spring & Steel Company, Pittsburgh, Pa., has moved its New York office to suite 2038, Grand Central Terminal. The office is in charge of J. N. Brownrigg, eastern sales agent.

The Isthmian Canal Commission will receive bids until December 28 for miscellaneous supplies, including varnish, granulated cork, pipe fittings and valves, gages, hardware and electric fans. (Circular No. 613 B.)

T. H. Price, lately connected with the Horace L. Winslow Company, Chicago, demonstrating the Clark blow-off system, has gone to the Indian Refining Company, Cincinnati, Ohio, as a representative in the railway lubrication department.

Frederick G. Ely, a director of the Pressed Steel Car Company, Pittsburgh, Pa., died on the afternoon of December 12. Mr. Ely has been identified with the railway supply business for many years. He was a brother of T. N. Ely, chief of motive power on the Pennsylvania Railroad.

The Globe Seamless Steel Tubes Company, Milwaukee, Wis., has completed its new plant and is now taking orders for cold-drawn seamless steel boiler flues and mechanical tubing. The mill is of modern construction throughout and is thoroughly equipped to handle an output of 2,000 tons a month.

Charles J. Nash, chief mechanical engineer of the W. H. Miner Co., Chicago, and for 14 years mechanical engineer of the Pullman Company at the Chicago works, was on December 1 appointed a representative of the Westinghouse Air Brake Company, Pittsburgh, Pa., with headquarters in the Railway Exchange Building, Chicago.

Walter L. Pierce, general manager and director of the Lidgerwood Manufacturing Company, New York, died suddenly of heart disease on the night of December 9. Mr. Pierce was also vice-president of the Gorton & Lidgerwood Company, and treasurer of the Hayward Company. He was a member of the Lawyers' and Engineers' Clubs.

The Western Electric Company, Chicago, has declared an extra dividend of 2 per cent. for the fiscal year ending December 31 next. This, with the regular 8 per cent. dividend, makes 10 per cent. for the year. Due to the change in date of the fiscal year from November 30 to December 31, the company has declared a dividend of 1 1-3 per cent., payable December 31, covering the months of November and December. The $5,000,000 4½ per cent. two-year notes have been called for payment January 1 next at 100½, and $15,000,000 5 per cent. bonds have been sold partly to provide funds for the redemption of these notes. The company will have no debt except this $15,000 issue after the notes have been paid off.

TRADE PUBLICATIONS.

Southern Pacific.—This company has published an attractive booklet on the agricultural possibilities and the development of Sherman county, Ore.

Canadian Pacific.—The 1911 calendar sent out by this company shows a view of its combined fleet of Atlantic, Pacific Great Lakes, and British Columbia lake, river and coast steamships.

Northern Pacific.—The passenger department has published a 32-page booklet called "On the Wings of the Wind." It describes the luxurious accommodations on its trains and gives illustrations of the scenic beauty along its lines.

Rail Inspection.—Robert W. Hunt & Co., Chicago, have issued a booklet descriptive of their inspection service for rails, cars, track appliances and electrical equipment. The booklet includes full specifications for steel rails and other valuable data.

Arc Lamps.—Bulletin No. 5500 of the Western Electric Company, Chicago, takes up the Hawthorn direct and alternating current enclosed arc lamps. The bulletin replaces bulletin No. 5500 of October, 1909. It has 20 pages and is fully illustrated.

Electric Semaphore Signals.—Bulletin No. 50 of the Union Switch & Signal Company, Swissvale, Pa., is devoted to the Union style T electric semaphone signal. This pamphlet has 14 pages of diagrams and detailed information about the working of the signal.

Centrifugal Pumps.—The American Well Works, Aurora, Ill., has published its catalogue No. 117 on centrifugal pumps. This catalogue contains over 125 pages, is completely illustrated and gives detailed information and advantages of the various centrifugal pumps. Many instructive tables are also included.

Power Presses.—Joseph T. Ryerson & Son, Chicago, are distributing a catalogue describing the company's punch presses, pendulum foot presses, bench presses, inclinable presses, power punching presses, wiring presses and toggle presses. The booklet is 8½ in. x 11 in., contains 21 pages and is well illustrated.

Skylights.—Catalogue No. 5 of the David Lupton's Sons Co., Philadelphia, Pa., describes the Lupton steel sash for side walls; the Lupton rolled-steel skylights for all buildings; the Lupton hollow metal fireproof window; Waldmire louvers; Pond continuous sash, and the Pond operating device for all types of windows. The catalogue gives many illustrations and diagrams showing the advantages of the Lupton products.

San Pedro, Los Angeles & Salt Lake.—The souvenir menu card for Thanksgiving used on the dining cars of the San Pedro, Los Angeles & Salt Lake had a neat white cover with an inset. The cover bore a painting suggestive of the season, which was well reproduced in color. Copies of the menu ready for mailing were furnished the patrons, on request, by the dining car conductors.

1911 Diary.—A diary published by the Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., describes briefly Westinghouse progress in a number of products, such as Cooper Hewitt electric lamps, gas and steam engines, electric locomotives, electric lamps. Useful data are given on these subjects, including tables on the resistance of wires, the heating value of some American coals, etc. The diary also contains miscellaneous information, such as the population of cities and the best hotels.

Blueprints.—The C. F. Pease Co., Chicago, has published a complete catalogue of blueprint machinery and drafting room supplies. Special attention is devoted to the advantages of the Pease whiteprint as compared with a blueprint. The prints are made directly from the tracing and the lines are blue on a white background. It is claimed that these prints are clearer and more durable, and that the process is simpler and just as rapid as the blueprint process. The catalogue is about 100 pages long, fully illustrated, and gives detailed information about automatic blue and whiteprint machinery.

Magneto Telephone Sets and Accessories.—The Western Electric Company, New York, has issued bulletin, No. 1116, describing magneto telephone sets and accessories. Several pages are devoted to the design and construction of wall and desk sets, and the No. 1317 type wall set is fully described. This is the telephone set on which $10,000 was spent in designing before the first model was approved, and it is this set which has gained the enviable record of a quarter-million of sales in twenty months. It has been made the standard for service on thousands of rural lines and in the circuits of mines and railways, both steam and electric.

Tungsten Lamps.—The General Electric Company, Schenectady, N. Y., has published its bulletin No. 4769 on train lighting with General Electric Mazda and tantalum lamps. Both these

lamps have tungsten filaments. It is claimed that they are cheaper to install than the carbon lamps; that they require less equipment; that they consume less power; that they last twice as long, and that they keep a more even brilliancy throughout their lives. The characteristics of both lamps are given in detail, with illustrations. Three systems of supplying current are briefly described: the head-end, the straight storage and the axle generator. The bulletin ends with a well illustrated article on illumination and methods of arranging the lamps.

Chicago, Rock Island & Pacific.—The passenger department of the Rock Island Lines has issued three new publications on California and the Rock Island's Golden State Limited service. A 50-page booklet describes the scenery, cities, fruit growing industries and historical points reached by the Rock Island Lines and a 57-page vest pocket booklet gives a great deal of useful information for tourists desiring to see these points. In it are outlined three short trips, one requiring seven days, one fourteen days and one thirty-nine days. The important points to see and the facilities for seeing them are well described. A folder calls attention to the service afforded by the Rock Island's Golden State Limited, which is called the "Limited Train of Limitless Luxuries."

Foundry Equipment.—The Whiting Foundry Equipment Company, Harvey, Ill., has issued catalogues Nos. 45, 51, 52, 55, 58, 59, 77, 78 and 80. No. 45 contains 150 pages of descriptions and illustrations of the various types of electric and hand cranes. It contains a great number of illustrations of plants where these cranes have been recently installed which show well the possibilities of such installations for many industries. The other catalogues are in pamphlet form and in the order named deal with the following subjects: Air hoists, brass foundry equipment, power sand sifters, ladles, elevators, cranes, trucks and turntables and tumblers. All of these publications are attractively prepared and are of standard 6 in. x 9 in. size with holes punched in the margin for filing.

1911 Calendar.—The Kennicott Company, Chicago Heights, Ill., is distributing an advertising calendar which will not be likely to find its way into the waste basket. It bears every evidence of being made for practical use and long service, as it is mounted on a special metal preparation called "enameloid." The hanger is 9½ in. x 17½ in. and carries a 365-day calendar pad 7 in. square, which makes it of a desirable size for office use. The hanger is colored dark blue, with gilt trimmings, and the instructions say that when soiled the brilliancy of the metal surface can be restored completely by the use of a damp cloth. The advertisement on the upper half of the hanger calls attention to the power plant equipment furnished by the Kennicott Company—water tanks, water softeners, heaters, water weighers, boilers and stacks. In addition to these, the company designs and builds steel tank cars and underframes. Although featuring a number of products at present, the Kennicott Company has never ceased its activity in its original line, water softeners. It has recently developed a new type of softener known as type K. A wall hanger, illustrating in colors the operation of this machine, is ready for distribution on request.

RAILWAY STRUCTURES.

Aberdeen, Wash.—According to local press reports, the Northern Pacific and Union Pacific will build a new union passenger station on the site of the present Northern Pacific station.

Buffalo, N. Y.—The Delaware, Lackawanna & Western has filed preliminary plans with the New York Public Service Commission, Second district, for a passenger station to be built in Buffalo.

Carbondale, Pa.—A conference has been held between the city officials, the Delaware & Hudson and the Scranton Traction Company to arrange for building a subway at Eighth avenue in Carbondale.

Chicago, Ill.—Various reports have been printed in the Chicago newspapers about plans for the new Union station. The recent developments can be very briefly stated. The roads using the present Union station, as has been previously stated in these columns, have definitely decided to build a new station. They have also commissioned Architect D. H. Burnham of Chicago to consult with the roads directly interested and make tentative plans. No plans have been adopted or even definitely submitted.

Colorado Springs, Colo.—The Denver & Rio Grande and the Chicago, Rock Island & Pacific, will build a new union passenger station.

Columbus, Ohio.—The Toledo & Ohio Central passenger station in West Broad street, was burned on November 23. The building was fully insured, the greatest loss being that of the company's records. The building was valued at $50,000.

Cordova, Alaska.—Some months ago the Copper River & Northwest completed work on a large steel bridge over the Copper river, between the Miles and Childs glaciers in Alaska. The same company is now engaged in putting up a steel cantilever bridge over the Kushalina river at mile post 149 from Cordova. Work is to be pushed all winter on the structure, which is to have a total length of 800 ft., and is to be 250 ft. above water level. This bridge is being built on an extension of the line to Kennecott, 200 miles from Cordova.

Corona, Cal.—The Pacific Electric is said to have selected a site for a new station to be built at Corona.

East St. Louis, Ill.—The freight station and warehouse of the Louisville & Nashville was burned on December 7. The loss is estimated at $25,000.

Greeley, Colo.—The Denver, Laramie & Northwestern contemplates improvements to its present freight offices and depot.

Janesville, Wis.—The Janesville Traction Company has given a contract to Shearer, Ford & Brothers, it is said, for putting up a brick and steel car barn at Janesville.

Minneapolis, Minn.—The Minneapolis, St. Paul & Sault Ste. Marie has received a building permit for a one-story brick and steel foundry to be built at 29th avenue S. E. and Quincy street, to cost about $18,000.

Oakhurst, Cal.—See Winkler, Cal.

Ogden, Utah.—The Denver & Rio Grande has prepared plans for a $50,000 passenger station.

Piedra, Cal.—See Winkler, Cal.

Portland, Ore.—The Southern Pacific, according to local press reports, will build a new roundhouse on the west side of the river, and a new roundhouse and repair shop on the east side, at total cost of $1,000,000.

Punxsutawney, Pa.—The officials of Punxsutawney and the Pennsylvania Railroad will jointly build a bridge, it is said, over the tracks of the railway at South Penn street.

Shreveport, La.—The new passenger station at the terminal of the Louisiana & Arkansas in the business section of Shreveport, La., is to be completed on or before January 1 next. It will also be used by other railways, including the St. Louis Southwestern.

Somerville, Tex.—The Gulf, Colorado & Santa Fe will build a brick machine shop as an addition to its 10-stall roundhouse.

St. Louis, Mo.—The Illinois Traction System has started condemnation proceedings to secure certain property necessary to complete the site for its new terminal station at Twelfth and Linden streets.

Wichita, Kan.—The Atchison, Topeka & Santa Fe will build a large freight depot, to be used jointly with the St. Louis & San Francisco and the Kansas City, Mexico & Orient.

Winkler, Cal.—The Santa Fe will build new stations, it is said, at Winkler, at Oakhurst and at Piedra.

The extension of the Paraguayan Central from its present terminus at Yuty, 157 miles from the capital, to Villa Encarnacion, on the Alto Parana, is said to be nearly completed. The present rolling stock of the Paraguay Central has been bought by the Argentine government and will be transferred to its railway in Patagonia. New cars and engines of English manufacture have begun to arrive, including 20 locomotives, 26 passenger cars and 229 freight cars.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Green Bay & Western has ordered two mogul locomotives from the American Locomotive Company. The cylinders are 19 in. x 26 in., the driving wheels 56 in., and the total weight in working order 135,000 lbs.

The Gua Oui La Paz Railway has ordered one consolidation locomotive from the American Locomotive Company. The cylinders are 16 in. x 24 in., the driving wheels 46 in., and the total weight in working order 97,000 lbs.

The Atlanta & West Point has ordered one ten-wheel freight locomotive from the American Locomotive Company. The cylinders are 21 in. x 28 in., the driving wheels 61 in., and it will weigh 188,000 lbs. in working order.

The Chicago & Alton has purchased three consolidation locomotives from the American Locomotive Company. These locomotives were in stock in the company's plant and are now in service.

CAR BUILDING.

The Gulf Lumber Company is in the market for 10 logging cars.

The Wichita Falls & Northwestern is in the market for 100 box cars.

The Chesapeake & Ohio is said to be in the market for 200 40-ton flat cars.

The St. Louis Southwestern is in the market for 1,500 box cars and 500 flat cars.

The Seaboard Air Line will build 200 steel underframe flat cars at its shops.

The Pittsburg Railways have ordered 50 cars from the Pressed Steel Car Company.

The Boston Elevated has ordered 50 steel underframe surface cars from the Laconia Car Company.

The Nashville, Chattanooga & St. Louis has ordered 100 box cars from the American Car & Foundry Company.

The Louisville & Nashville will build 600 hopper and 600 gondola cars at its shop. The steel underframes of these cars, as mentioned last week, were ordered from the Pressed Steel Car Company.

The Jamison Coal & Coke Company, reported in the *Railway Age Gazette* of November 11 as being in the market for 400 50-ton hopper cars, has ordered this equipment from the Standard Steel Car Company.

IRON AND STEEL.

The Duluth & Iron Range has ordered 9,300 tons of structural steel from the American Bridge Company, for use in an ore dock at Two Harbors, Minn.

The Boston Elevated has ordered 4,500 tons of structural steel from the American Bridge Company.

The New York Central will need about 150,000 tons of rails for renewals. Special specifications for this order are being prepared. The United States Steel Corporation and the Lackawanna Steel Company will make experimental rollings of 10,000 tons each, subject to the tests required by the railway, so that they will be able to name the price at which they can furnish the rails.

The Pennsylvania Railroad order for 150,000 tons of rails is still under dispute. Representatives of the steel companies interested in the order met at the Railroad Club in the Hudson Terminal building on December 12 to discuss the road's specifications. It was made known several days ago that a hitch had arisen over the terms of the contract, and on the 12th it was stated that the trouble lay rather in the physical tests required by the Pennsylvania Railroad than in the chemical analytical tests of the rails. After the meeting it was said that the matter would probably be discussed further. The manufacturers, it is understood, are objected to the prospective additional cost entailed because of the rigid requirements of the road.

General Conditions in Steel.—There has been a sharp falling off in mill operations and shipments. The unfilled orders reported on November 30 are the smallest in the history of the United States Steel Corporation. By the basis of compiling unfilled orders used two years ago, the present orders would appear more favorable. It is admitted that not even a reduction in prices would induce consumers to enter the present market. An upward tendency of bookings is anticipated after the first of the year.

SIGNALING.

The plans of the signal department for the Coast lines of the Atchison, Topeka & Santa Fe for 1911 include the installation of automatic block signals on 45 miles of line. These will be upper-quadrant semaphores, three-position, normal clear, with alternating currents for track circuits. It is proposed to install mechanical interlockings at Suwanee, N. M., Dennison, Ariz., and Cottonwood, Cal., where meeting points are to be arranged with lap sidings. In these plants the switches will be mechanically operated; but the signals will be worked by electric motors, drawing current from primary batteries. Electric interlocking plants will be put in at Richfield, Cal., and Rio Puerco, N. M., 24 levers each. Electric interlocking plants of 36 levers each are now being built at Daggett and Fullerton, Cal. The signals at all of these plants will be upper-quadrant three-position.

The Breakage of Staybolts.

BY B. E. D. STAFFORD.

The alternating stresses to which a staybolt is subjected in locomotive firebox service, demand a material with a tough fibrous structure. A good grade of charcoal iron, puddled, refined, reworked, and developed to the wrought bar under various methods of piling to obtain a strong center structure, produces a material which is the safest and most reliable for staybolt purposes. Staybolt breakage, however, is not a question of material so much as of construction. When rigidly stayed, the locomotive firebox affords but slight provision, if any, for the difference in the amount of expansion that naturally exists between the firebox and the wrapper, or outer sheet, of the boiler under varying temperatures of furnace operation. While the thin fire sheets, by distorting, bending, and buckling, accommodate to a certain extent the added stress due to the difference in the amount of expansion when rigidly stayed, the inevitable consequence is that the staybolt gives way under excessive stress, regardless of the material used, and the sheets gradually deteriorate, due to the continual bending and distortion.

The most important feature that has been demonstrated in connection with the method of staying the locomotive firebox, was recently brought to the notice of the railway world in a paper read before the New York Railway Club on May 20 of this year by D. R. MacBain on the subject of Inequality of Expansion in Locomotive Boilers and the Possibilities of Eliminating the Bad Effects Therefrom. For the purpose of practically demonstrating the theories on which earlier experiments were based with partial flexible and rigid staybolt installations, a high pressure locomotive was selected whose firebox was completely stayed with flexible staybolts. It was placed in heavy passenger service, and the records and data which were obtained show clearly the advisability of giving careful attention not only to the use of the flexible stay, but also to the method of its application to render the firebox less liable to the effects of expansion. From the practical experiments made, it was found by tramming the inside of the firebox sidesheet and the outer sheet when the boiler was cold, and com-

paring the measurements when the boiler was hot, that the difference of expansion of both sheets was too significant to be ignored.

To compensate for the difference in the amount of sheet expansion, adjustments were made in the application of the flexible staybolts by turning back the bolt head from its sleeve seat certain parts of a turn, before riveting over the firebox end of bolt. This was done in the outer rows of the side sheets, back head and throat sheet, the amount of release being varied according to the size of the firebox and the relative showing in the difference of sheet expansion. By so doing, it enabled the firebox and outer shell to expand under less restraint, and the staybolts to assume the load with less liability of being strained than under former practice of no adjustment. The results obtained proved satisfactory, the experiment and practice extending over a sufficient number of years to obtain comparative data and form reasonable conclusions, not only as to the life of the staybolts, but as to the condition of seams, rivets, side and flue sheets, all of which showed no perceptible indication of strain or distortion.

Further investigation by others not connected with but interested in the aforementioned experiment, disclosed the fact that when flexible staybolts were adjusted, especially in the throat sheets, to compensate for the longitudinal extension of the wrapper sheet over the firebox sheets, in instances where this method was applied to old fireboxes, when the staybolts were removed for firebox renewals it was discovered, by nicking and bending the iron in the bolt proper, that the material was as fibrous and as strong as when first incorporated. The bolt head showed a distinct bearing surface at the sleeve seat, demonstrating that under the adjustments made, it served its purpose as a stay, resisting the load due to pressure without becoming strained, and that the difference in the relative sheet expansion is largely compensated for by the adjustment which the flexible stay affords. Expansion of all heat absorbing parts in a locomotive firebox, if restricted, will effect the entire assemblage and prove disastrous to the weaker part of the construction.

The value of the difference in the amount of expansion between the firebox sheets and the roof or wrapper sheet has never been seriously considered to any extent until quite recently. It was supposed that most of the expansion was confined to the firebox proper, while the relative amount of expansion between the wrapper and the firebox sheets, and the resultant effect therefrom on the complete construction was overlooked in most instances, as a vital point to consider in dealing with methods of staying.

The distortion of sheets has more or less lengthened the life of the rigid stay, while the sheets deteriorated by reason of continual bending. While the relative expansion of the outer shell and the firebox varies with each type of boiler, and is largely influenced by methods of firebox and boiler operation, the difference in the amount of expansion is at times so great as to throw an excess stress on staybolts in the throat, back head and rigid corners of the side sheets. Regardless of sheet distortion, the bolts then assume a load too severe to withstand and are gradually rendered weak, and break.

The flexible staybolt has had much to contend with on points of cost compared with the rigid stay, and not until the question of economy of maintenance was earnestly considered, where ultimate costs determined the true value of a product based on service rendered, could we point to any great advance in the use of the flexible stay, or the methods of staying. Flexible staybolts found but little favor until within the last six years. The early designs were either too large or ungainly, or too weak in sections to cope with firebox conditions. The two-piece bolt of the Johnston type made great headway as a simple and strong device to serve the purpose of a water space stay, but was soon declared obsolete by reason of the fact that inspection was impossible without removing the entire bolt. Incrustation in bad water sections rendered the connection rigid, cementing both the plug and the bolt intimately together.

The principle of the three-piece design for a flexible stay, was recognized as the most acceptable on which to base improvements and modifications soon led to shapes and sections involving the round head bolt. This affords greater shearing strength, and more readily releases itself under conditions of incrustation, than similar designs of the flat or sloping heads. The line of demarkation between serviceable and non-serviceable staybolts of the flexible type is determined largely on the merits which enable the bolt to operate under conditions of incrustation. The flaring mouth on the end of the sleeve of the round head bolt extending toward the water space serves to loosen and throw out all deposits which collect within the water space in adjusting itself to accommodate the relative sheet expansion under various temperatures.

The round head bolt design with its strong sections of bolt area, capped over with sufficient clearance between the cap and the bolt head to allow for suitable adjustment to the difference of sheet expansion, affording a ready means of inspection, with its several sizes of sleeves to suit the various angles and sheet contours of boiler design, adapted to take several diameters of bolt and affording interchangeability of parts, simple and economic in its application, forms an assemblage which readily establishes itself as an acceptable article of economic merit and serviceable value, and is fast proving the fact that flexible connections in firebox construction are absolutely needed.

The demand for flexible staybolts is due to the effort to curtail not only the resultant expense of staybolt renewals, but more largely to reduce the number of shoppings of engines for the purpose of renewing broken staybolts and repairing cracked fire sheets, which not only deprives the service of power, but contracts the earning value of each engine in direct proportion to the maintenance cost and the service rendered.

Essential to the economic solution of overcoming cost of maintenance in firebox repairs is the step that will first favor the construction of parts to more readily resist the stress of expansion without the strain of distortion, heretofore found so disastrous to all materials involved, and provide sufficient means to allow all heat absorbing surfaces to act under less restraint than that afforded by the complete system of rigid staying. Until locomotive boilers are measured to obtain the true amount of the difference of expansion from the cold to the hot state, and provisions are made to accommodate the relative amount of expansion between the wrapper sheet and firebox, the cause of staybolt breakage, fire sheet and flue sheet cracking, will remain an issue of misleading conclusions, if as in the past, quality of material forms the basis of solution, and the destructive forces due to the inequalities of expansion are ignored.

The flexible or adjustable staybolt so far has favored the theories of those who are mindful of the fact that steam boilers must breathe or expand under less restraint than that allowable with rigid staying. In the experiments and practical demonstrations made in the application and adjustment of the flexible staybolt to high pressure locomotives, covering, in many instances, years of constant service without staybolt breakage, side seams leaking, and sheets cracking, and obtaining a great reduction of breakages in most cases, the value of the service rendered compared to the cost of repairs is a unit of economic comparison, which not only credits the flexible staybolt as being superior to the rigid stay in localities of greatest sheet expansion, but also points conclusively to the advantage gained in the judicious use of the flexible or adjustable staybolt as a compensating medium of great utility in affording sufficient flexibility to the firebox construction, enabling such to more safely cope with the alternating stresses due to expansion.

The general recognition given to the flexible staybolt in late years, as an article of economic use and of practical utility, and to the methods of its application and adjustments necessary in the rigid localities of greatest sheet expansion to relieve the bolt of excess tension; the judicious layout in the effort to fully cover the breaking zone according to each type of firebox, and to minimize the effects of the alternating stresses so disastrous to staybolts—all features of vital importance—have to the extent of the consideration given and the practice followed, accomplished much to advance the general proposition of eliminating staybolt breakage and fire sheets cracking, inasmuch as the cause of breakage is traced to its true source.

President Gomez has signed a decree contracting with the Cuban Central Railways, Limited, for the construction of new railways and granting the subsidy prescribed by the law of July 5, 1906. The railway lines concerned are those from Sagua la Grande to Corralillo, by way of Rancho Veloz, and from Cifuentes to La Esperanza, by way of San Diego del Vallo. A bill was introduced in the Chamber of Representatives under date of November 16 to authorize the executive to contract for building a railway from Guantanamo to Baracoa, with application of the subsidy law.